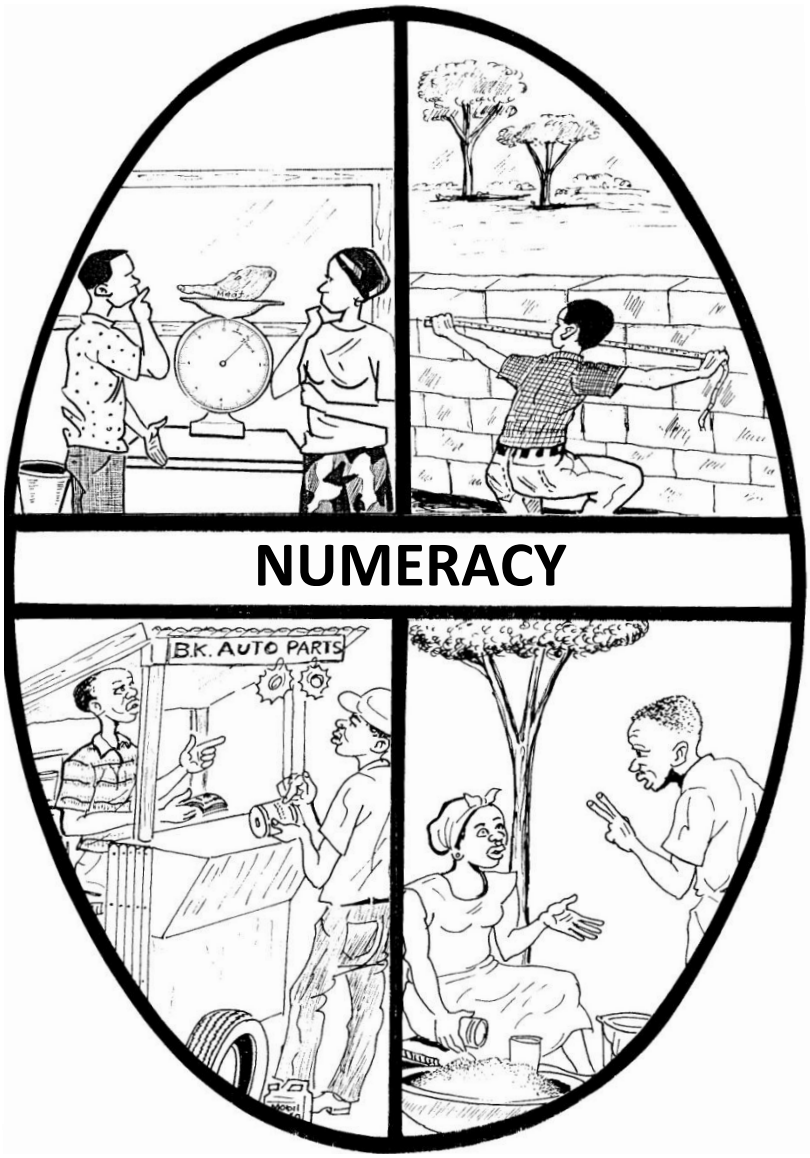
Alternative Basic Education Curriculum



Facilitator's Manual for Numeracy

Level 1, Semester 2

August 31, 2011

Ministry of Education, Government of Liberia

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Non-formal Education Curriculum

Content Area: NUMERACY

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Module	**COMPETENCIES** Teaching and learning activities in this module will help the learner develop the following competencies:	**LESSON TOPICS** This module includes the following lesson topics:
C: **The World in Numbers** **(Geometry and Measurement)**	• To understand the meaning of the placement of digits in a number • To be able to read numbers up to 999 • To be able to read and write numbers up to 1000 • To be able to enter numbers into a calculator properly • To be able to use a calculator for basic calculations • To understand geometry as the mathematics of measuring the world • To be able to identify the names and parts of fundamental geometrical shapes: point, line, angle, triangle and rectangle • To be able to identify square and circle and the parts of each • Be able to use skills of observation to identify geometrical shapes in patterns • To be able to identify shapes and use precise observation skills • To be able to use a table to organize and present information • To understand what, how and why we measure • To understand details of how time is divided • To be able to use a digital clock to tell time • To be able to read scale intervals • To be able to read a thermometer	**Topic 26: What the place of the number Tell us:** 1. Place value of Ones and Tens and Hundred **Topic 55: Reviewing Numbers to 1000, and introduction to Using a calculator.** 1. Reviewing large numbers 2. Introduction to Calculator **Topic 56: Correct Use of a calculator for Calculation** 1. Addition 2. Subtraction 3. Multiplication **4.** Division **Topic 57: Introduction to Basics of Geometry and Fundamental Shapes** **Topic 58: More Fundamental Shapes: Squares and Circle.** 1. Squares 2. Right Angles **3.** Circle **Topic 59: Finding and Tallying Shapes** **1. Drawing** **Topic 60: Introduction to Measurement** 1. What is Measurement 2. Tools for Measurement 3. Completing the Table 4. Standard units **Topic 61: Measurement of Time – Units of Time.** 1. The Triangle of Time 2. Reviewing Telling Time **Topic 62: Measurement of Time – Digital Clocks.** 1. Analog Clocks 2. Digital Clocks

Module	**COMPETENCIES** Teaching and learning activities in this module will help the learner develop the following competencies:	**LESSON TOPICS** This module includes the following lesson topics:
	• To know important temperature benchmarks such as body temperature, the boiling and freezing point of water, etc. • To understand the need for standard units • To be able to measure using inches • To understand the relationship between feet and inches • To be able to measure objects in feet and inches • To understand the relationship between feet and yards • To be able to measure in feet and inches and yards • To be able to understand the relative size of a mile • To be able to choose appropriate estimates of lengths • To know pounds are the standard unit of weight • To know some important benchmark weights • To understand the relationship between ounces and pounds • To understand the concept of capacity (volume) • To know the relationship between gallons and quarts • To understand the relationship between volume units including cups, pints, and quarts • To be able to use volume measurements to	**Topic 63: Introduction to Reading Skills Interval: Preparation for Thermometers** 1. Review of Skip Count, and Reading Skills Interval **2.** Using the Skills Interval for Reading. 3. Other Skills Intervals **Topic 64: Measuring Temperature** 1. What is Temperature? 2. How does a Thermometer Work? 3. Units 4. Common Temperature **Topic 65: Measurement of length – Standard and Non-Standard Units.** 1. Non-Standard Units 2. The Inch 3. A Physical Inch on the Body **Topic 66: Using Feet and Inches** 1. From Inches to Feet 2. The Foot 3. Feet and Inches 4. Measuring **5.** Physical Foot on the Body **Topic 67: Using Yard and Feet** **Topic 68: Miles, and Practice with Measurement and Estimation.** 1. Miles **2.** Relationship among the Standard Units**.** **Topic 69: Measuring Weight – Pounds** 1. Weight – what is it? 2. Estimating Food and recipe **Topic 70: Measuring Weight – Ounces** 1. Pounds and Fractions of pounds 2. Ounces 3. Which one to use? **Topic 71: Measuring Volume(Capacity) – Gallons, Quarts, and Pints**

Module	**COMPETENCIES** Teaching and learning activities in this module will help the learner develop the following competencies:	**LESSON TOPICS** This module includes the following lesson topics:
	make Oral Rehydration Solution • To be able to draw a simple map using proportional drawing • To complete the classroom map, and an outdoor map as well if time allows • To make presentations to the group and to assess accuracy of a map • To be able to make a map of a larger geographical space – a neighborhood • To develop skills of observation and visual memory • To understand the cardinal directions of the earth • To be able to read basic information from a map of Liberia • To be able to identify Liberia on a map of Africa • To be able to read a map of Liberia and identify features • To be able to estimate distances between points on a map using the map scale • To be able to organize efforts to make a community map • To make the foundation of a community map showing the major roads • To be able to gather information about community resources in order to make a map • To place various community resources on the community map with accurate placement	1. What is Volume? 2. How do we measure Volume? 3. What are some Standard units of Volume? Gallons, and Quarts. 4. Pints 5. Health FACTS Related to Volume in our body. **Topic 72: Using Volume Units to Make Oral Rehydration Solutions (Cups, Ounces)** 1. Pints and Cups 2. Ounces –for Volume 3. Using measurement for an Important Recipe **4.** The Recipe **Topic 73: Proportional Drawing and Map-Making** 1. Drawing 2. Maps **Topic 74: Map-Making – Making a Map of the Classroom** 1. Finishing the Maps 2. Presentations **Topic 75; Making a Home Neighborhood Maps** **Topic 76: Reading maps of the World and Africa** 1. The earth and the 4 Directions 2. Africa on the Earth 3. Map of Africa **Topic 77: Reading a Map of Liberia and determining the distance** 1. Map of Liberia 2. Determining distance on a Map **Topic 78: Service Activity – Making a Community Map, Part 1** 1. Introducing this Service actitivity 2. What are some other community resources you can think of/ 3. The Map **4.** Getting started

Module	**COMPETENCIES** Teaching and learning activities in this module will help the learner develop the following competencies:	**LESSON TOPICS** This module includes the following lesson topics:
	• To be able to label community resources • To be able to work in a group on a project • To be able to produce the finished community map • To be able to assess learners' mastery of the topics in Module C, as well as earlier fundamental skills	**Topic 79: Service Activity - Making a Community Map, Part 2.** 1. List of Community Resources 2. Continuing the map **Topic 80: Finalizing the Community Map and Review.** 1. Finishing the Map 2. Reviewing for Evaluation (Next class) 3. Reviewing **Topic 81: Evaluation** 1. Evaluation Questions Module C
D: **The News in Numbers** **(Data and Statistics)**	• To review and practice addition and subtraction of larger numbers • To be able to read and write and add numbers in the thousands • To be able to add lists of numbers • To be able to subtract numbers in the hundreds and thousands • To gain more skill at adding and subtracting • To apply skills of addition and subtraction to measurement and geometry, as well as money • To review the operation of multiplication and the facts up through 10x10 • To be able to multiply 2 digits by 1 digit without carrying over • To apply multiplication skills to story problems • To be able to solve 2-digit x 1-digit multiplication problems with carry-over	**Topic 82 : Addition and Subtraction Practice – 3 Digit Numbers** 1. Review 2. Adding Large Numbers **Topic 83: Introducing the Thousands, Adding/Subtracting** 1. Review Place Value Column 2. The Thousands 3. Reading Thousands 4. Adding in the Thousands 5. Carrying over into the thousands **Topic 84: Adding the list of Numbers** 1. Adding Small Lists of Numbers 2. Lists of larger Numbers **Topic 85: Subtraction and Practice** 1. Review subtraction without Borrowing 2. Reviewing Subtraction with Borrowing 3. Subtraction With large numbers **Topic 86: More Addition and Subtraction Practice – Perimeter and Shopping Lists** 1. Introduction and Perimeter 2. Two Activities a) Shopping b) Measuring Perimeter

Module	**COMPETENCIES** Teaching and learning activities in this module will help the learner develop the following competencies:	**LESSON TOPICS** This module includes the following lesson topics:
	• To develop confidence in multiplication • To review the basic concept of fractions • To be able to read and write and represent commonly used fractions • To be able to measure objects in fractions of feet • To be able to measure objects in fractions of inches • To be able to apply measurement skills to design shelves • To be able to gather information to calculate how much the project would cost • To understand the relationship between commonly used fractions and percents • To be able to interpret circle graphs as representations of percents • To be able to interpret percent information presented in circle graphs • To be able to estimate relative percents • To be able to organize a survey • To be able to gather and organize the information from a survey • To be able to generate a bar graph from survey data • To use survey and graphing skills to conduct a survey of community issues • To present information and interpret the results • To record expenses in an accounting format • To be able to use this financial information to	**Topic 87: Multiplication Practice and 2 Digit X 1 Digit Number With No Carry over** 1. Brief Review of Multiplication Facts. 2. Long Multiplication Introduction **Topic 88: Practicing Long Multiplication With No Carry Over yet.** 1. Review 2. Story problems 3. Presentation **Topic 89: Long Multiplication With Carry-over** 1. Review Without Carry-over 2. Demonstrate With carry-Over **Topic 90: Games to Practice Long Multiplication** 1. Random Problems 2. Group Contest **Topic 91: Fraction Review** 1. Review of Fractions 2. Practice **Topic 92: Measuring Feet and Inches With Fraction.** 1. Inches as fractions of Feet 2. Measuring fractions of Feet 3. Fractions of Inches 4. Measuring Fractions of Inches **Topic 93: Using Fractions – A Classroom Shelving Project** 1. Introduction 2. The Project **Topic 94: Introduction To Per cents** 1. Introduction of the meaning of "per cent" 2. Sizes of Per cent **Topic 95: Showing information With per Cent** 1. Using Per cent 2. Using per cent to show

Module	**COMPETENCIES** Teaching and learning activities in this module will help the learner develop the following competencies:	**LESSON TOPICS** This module includes the following lesson topics:
	analyze a family's expenses • To be able to enter information into a table • To be able to interpret a circle graph • To understand basics of nutrition, and become aware of eating habits • To plan a garden • To use nutrition information as well as measurement and calculations to design a garden • To be able to analyze data from a long-term finance project • To review topics from this Module and all of Level 1 • To be able to assess learners' mastery of the topics in Module C, as well as earlier fundamental skills	Information. **Topic 96: Project 1: Class Surveys and Making Bar Graph** 1. Setting the Surveys 2. Taking the Information 3. Presenting the data – making a Bar Graph. **Topic 97: Project 1: Continued –More Class Surveys** 1. Revision of last Class Bar graph 2. Small Survey project in the class **Topic 98: Conclusion of Class Survey** 1. Finishing Project 2. Presentation **Topic 99: Project 2: Community Survey, Part 1** 1. Introducing the Project 2. Survey techniques out in the community. 3. Deciding What to Survey About **Topic 100: Project 2: Community Survey, Part 2** 1. Checking In **2.** Continuing the Survey Work **Topic 101: Project 2, Community Survey: Conclusion: Bar Graphs and Result** 1. Making Final bar graphs 2. Presentation 3. Next Step **Topic 102: Project 3, Family Finance; Part I; Setting up Record – Keeping** 1. Introduction 2. Keeping track of Expense – Making a data table 3. Predicting **Topic 103: Project 4, Nutrition: Introduction to Nutrition.** 1. What Do We Eat? 2. Types of Food – Information cards

Module	**COMPETENCIES** Teaching and learning activities in this module will help the learner develop the following competencies:	**LESSON TOPICS** This module includes the following lesson topics:
		3. What types of Food Do We Eat/ 4. What Should We Eat, and How Much? **Topic 104,Project 4, Nutrition: Planning a garden** 1. Gardening habits Discussions 2. Planning A Garden 3. The Parts of the Plan. **Topic 105: Project 3, Nutrition: Conclusion: Finishing the Garden** 1. Finishing the garden plan 2. Presentations 1. Review **Topic 106: Returning to Project 3, Family Finance; Where Does the** Money Go? 1. Introduction 2. Organizing the Data 3. Making the Gar Graph 4. Learning from the Information **Topic 107: Review of Level 1** **Topic 108: Evaluation**

Module C

Module C: "The World in Numbers" (Geometry and Measurement)

By the end of the module, learners will be prepared to:

- Use standard units to measure length and capacity
- Use digital tools such as a calculator and digital clock
- Identify geometrical shapes and their component parts
- Read and draw maps

Overview

Learning Objectives: The learner who successfully completes this 9 week module should be able to:

- Use a calculator for calculations
- Read time on a digital clock
- Understand that measurement involves specific units for specific measurable quantities
- Read a thermometer and know benchmarks such as body temperature
- Read intervals on a scale such as a thermometer
- Know the units of length, their relative sizes, and when to use each one: inches, feet, yards, miles
- Measure objects in inches, feet or yards
- Know the units of volume, their relative sizes, and when to use each one: ounces, cups, pints, quarts, gallons
- Know how to make Oral Rehydration Solution using measurement skills
- Identify basic geometrical shapes and their parts (side, angle, etc)
- Understand that a map represents the relative position of places and objects
- Draw a simple map of the classroom
- Read the major features on a map of Liberia, and be able to identify relative distances and directions of places on the map
- Make a community map

Links with other modules: Continues and extends the numeration work of Module B into calculator usage. The introductory work with maps will lead into Module D, with its focus on data and representation of information.

Estimated length of module: 27 lessons = 3 lessons per week = 9 weeks

LESSON	MODULE C LESSON TITLES
55	Reviewing Numbers to 1000, and Introduction to Using a Calculator
56	Correct Use of a Calculator for Calculations
57	Introduction to the Basics of Geometry and Fundamental Shapes
58	More Fundamental Shapes: Square and Circle
59	Finding and Tallying Shapes
60	Introduction to Measurement
61	Measurement of Time – Units of Time
62	Measurement of Time – Digital Clocks
63	Introduction to Reading Scale Intervals: Preparation for Thermometers
64	Measuring Temperature
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66	Using Feet and Inches
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68	Miles, and Practice with Measurement and Estimation
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71	Measuring Volume(Capacity) – Gallons, Quarts and Pints
72	Using Volume Units to Make Oral Rehydration Solution (Cups, Ounces)
73	Proportional Drawing and Map-Making
74	Map-Making – Making a Map of the Classroom
75	Making a Home Neighborhood Map

76	Reading Maps of the World and Africa
77	Reading a Map of Liberia, and Determining Distance
78	Making a Community Map, part 1
79	Making a Community Map, part 2
80	Finishing a Community Map, and Reviewing for Evaluation
81	EVALUATION

Materials needed for Module C:

- Tape measures
- Yardsticks
- Map of Liberia
- Scissors
- Large pieces of paper for posters and maps
- Rulers
- Thermometer, if possible
- Calculator(s)
- Digital clock or watch
- Lots of string or yarn
- Various objects such as rice, corn, salt, etc, as noted in the lessons
- Two pounds of sand and old newspapers
- Blank paper to prepare cards and posters

IMPORTANT NOTE to begin this Module:

- If your class DID NOT study the numbers from 99 to 999 in Lesson 26, Module A, please do that **first**. (Lesson 26 is repeated here below). Then go to **Part 2: Introduction to Calculators** in Lesson 55 that follows.
- If your class DID complete Lesson 26, please begin with Lesson 55 that follows.

Lesson 26: What the Place of the Numbers Tell Us: Place Value of Ones and Tens and Hundreds

(Review from Numeracy Facilitator's Manual, Level 1 Semester 1)

Lesson Learning Objectives:

- To understand the meaning of the placement of digits in a number
- To be able to read numbers up to 999

Preparation and Materials:

- Chalkboard and chalk
- Sticks
- Stones
- Number cards 0-9
- The 10's cards

Opener:

- Write the number 75 on the board and asks the learners: if they were to make this number out of sticks and stones, with each stick representing 10, and each stone representing 1, what would the number be? They should answer 7 sticks and 5 stones.

Activities: 45 minutes

Step 1:

- Remind the learners that each stick represents a 10 and the stones each represent a 1. So 75 means 7 tens and 5 ones. It is important to say it in this order (7 tens and 5 ones) so that the learners learn to write numbers in the correct place value from left to right.

Step 2:

- 75 is 7 tens and 5 ones. 7 tens is 70, and 5 ones is 5. So 75 = 70 and 5. This can also be shown again with the number cards as in the earlier activity.

- Show how to represent this number in a place value table:

	Tens	Ones	
75 =	7	5	70 + 5
52 =	5	2	50 + 2

30 =	3	0	30 + 0

Step 3:

- Now other examples, writing numbers on the board or giving prepared cards with different numbers on them: 45, 27, 18, 35, 77, 8, 60,40, 9, 10 etc. The learners should make the chart in their notebooks and write the numbers in the proper columns. If there is any problem, they can always build the number with sticks and stones.

- After they are finished they should check their work (especially check the numbers with 0 such as 60, or just 8, that 60 is 6 tens but 0 ones, and 8 is 0 tens but 8 ones.)

Step 4:

- Now ask about the number 99. It is 9 tens and 9 ones. Now if we add one more, that will be 10 tens, and it will be 100. So 10 tens is 100.

- Now ask about the number 100. Ten tens is one hundred. But we can't write the number '10' in the tens column, so we need a new *place* – for the hundreds. This is the third column.

Step 5:

- Now draw a new chart with hundreds:

	Hundreds	Tens	Ones	
100 =	1	0	0	100+0+0
136 =	1	3	6	100+30+6

- Another example is 136. The number 136 means :
  1 hundred, 3 tens, 6 ones 100 + 30 + 6 = 136.

- Give several examples of numbers between 100 and 200

- Now move into the 200's: 200 = 2 hundreds.
  246 = 2 hundreds + 4 tens + 6 ones

	Hundreds	Tens	Ones	
200 =	2	0	0	200+0+0
236 =	2	3	6	200+30+6

- Do many examples in the chart, showing how the hundreds work up to 999.
  300 = 3 hundreds
  400 = 4 hundreds, etc.

  Make sure the learners have this chart in their notebooks and they are copying down examples. Other examples:
  563, 479, 842, 307, Etc.

Practice:

- Ask lots of examples, for example: In the number 463, how many tens are there? (6) How many hundreds are there? (4)
- Write the number 463 in long form: 463 = 400 + 60 + 3

  The ability to do this is very important!!
- Ask the learners to put the numbers in order from smallest to largest:
  539, 427, 872, 136, 721
- Refer learners to the workbook for further practice.

MODULE C

Lesson 55: Reviewing Numbers to 1000 and Introduction to Using a Calculator

Lesson Learning Objectives:

- To be able to read and write numbers up to 1000
- To be able to enter numbers into a calculator properly

Preparation and Materials:

- Chalkboard and chalk
- A calculator

Opener:

To review

> **NOTE:** If you do not have access to a calculator, draw one on the board and 'pretend' to use it during the lesson to show how to use the buttons in the right way. But then also use this lesson time to practice addition, subtraction, multiplication and division.

Activities: 45 minutes

Part 1: Reviewing Large Numbers

Step 1:

- Review the columns (hierarchies) in numbers, and what they mean:

	Hundreds	Tens	Ones
200 =	2	0	0
236 =	2	3	6
674 =	6	7	4

Step 2:

- Practice reading and writing large numbers. Write numbers on the board and ask the learners to take turns reading the number properly out loud:
  158 945 435 338 649 504 etc.

- Ask them to break the numbers down:

  158 means 1 hundred, 5 tens, 8 ones. Do this with all of the numbers.

- Then ask them to put the numbers in order – Which one is largest? Smallest?

Step 3:

- Say a number out loud such as 736, and the learners should write the number down. Give several numbers to practice:

865 439 351 908 (*this one is tricky! Check carefully*) 527 162

- Check to make sure they are writing the numbers properly.

Step 4: **<u>Part 2: Introduction to Calculators</u>**

- Introduce the calculator without turning it on yet.
  Show the order of the numbers on the number pad, starting with 0.

- Ask the learners to review what the +, - , x, ÷ , and = signs mean.

- Turn on the calculator.
- Demonstrate how to enter numbers:

To enter a number, press the buttons in the same order that you would say or write the number. For example, to enter the number 657, you would press 6 then 5 then 7, so the screen then shows the number 657.

- Demonstrate that to then begin a new number, you must press the C button, which means CLEAR, so that the screen is cleared.

Step 5:

- Now let the learners take turns entering and clearing numbers. Say numbers out loud and they should type the number into the calculator. Make sure to give a large variety of numbers, such as :

54 348 7 14 749 50 43 998 200 407 9 10

Step 6:

- At this point, the learners can begin to experiment with the calculator. You can take this opportunity to also introduce larger numbers, like the thousands, with

4 digits:

- First enter 1, then Clear, then 10, then clear, then 100, C, 200, C, 300, C 400 etc to 900.
- Then 999, then 1000.
- Introduce the 4th column as the column of thousands. 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000.
- Practice entering and reading numbers such as 5400, 3600, 8900, etc.

Practice:

- The learners can practice with each other, with one person writing or entering a number into the calculator and then other learners practice reading the number and breaking it down:

  7436 = 7 thousands, 4 hundreds, 3 tens, 6 ones

- Refer learners to the workbook for further practice.

MODULE C

Lesson 56: Correct Use of a Calculator for Calculations

Lesson Learning Objectives:

- To be able to use a calculator for basic calculations

Preparation and Materials:

- Chalkboard and chalk
- A calculator, or more than one if more are available

Opener:

- First, write the following problems on the board and ask learners to copy them, writing them properly in order to solve them in their notebooks.

This is review: 46 + 28 = 85 – 47 = 9 x 8 = 90 ÷ 9 =

- Don't give the answers! They will come later in the lesson.

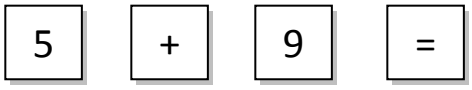
Activities: 45 minutes

Step 1: Addition

- Review the operation symbols on the calculator and what they each mean. Ask the learners to explain what + , – , x , ÷ , and = mean.

- **Demonstrate:** Now we're going to learn how to properly use a calculator to do these operations. Here's a sample problem: **What is 5 plus 9?** That is the casual way to ask a math question. But a calculator can't be used that way. The question must be asked in correct math. So we write the problem the way we learned: **5 + 9 =**

- And this is exactly how we will enter it into the calculator, pressing the buttons in that order:



- Notice that the + sign does NOT appear on the screen!! Only the numbers will show. So you have to be very careful that you press the correct operation button.

- And when you finally press the = sign, the new number that appears is the answer to the problem. You should see 14. If it does not say 14, you must Clear it and try again.

- Learners can double-check this with their addition charts from Module A.

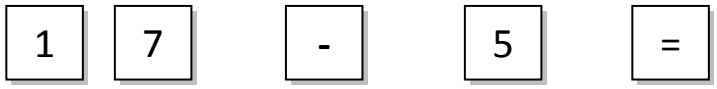
- Let a learner do another example: 8 + 7 =

- And then finally let a learner do the problem from the opener, 46 + 28 = showing how to enter the entire numbers:

- The learners can then check their answers from the Opener – were they right?? (should be 74)

Step 2: Subtraction

- Follow the same steps to demonstrate subtraction, using the – sign:
- What is 17 minus 5? To write this mathematically, it becomes 17 – 5 = . **Be careful that the larger number is written FIRST!!!!**
- Now enter this in the calculator, to show the answer 12:



- Now let a learner do the Opener problem: 85 – 47 = They can then check their answer.
- Let learners give each other more sample subtraction problems. Write them on the board first, then let someone solve them with the calculator.

Step 3: Multiplication

- Follow the same steps to demonstrate multiplication using the x sign:
  What is 6 times 9? Written mathematically it becomes 6 x 9 =
- Enter this in the calculator: 6 x 9 =
- Let a learner do the Opener problem: 9 x 8 = and check their answers.
- Let learners make up more problems to practice multiplication with the calculator.
- Remind the learners that this is what they were doing using their multiplication charts in Module B.

Step 4: Division

- Follow the same steps to demonstrate division using the ÷ sign:
- What is 24 divided by 3? Written mathematically it becomes 24 ÷ 3 =
- Notice that the order of the numbers is very important here!
- Enter this in the calculator: 24 ÷ 3 =

- Let a learner do the Opener problem: 90 ÷ 9 = and check their answers.

- Let learners make up more problems to practice division with the calculator.

> **NOTE: I**f the learners enter numbers that don't divide perfectly, they will get answers with a decimal point. This is a different way to write the remainder. But decimal numbers require additional instruction which will come later.

Practice:

- Learners can practice using the calculator to add up prices of items they may know of, or subtracting their expenses. Make up problems for them to solve in all 4 operations.

- If they have a calculator at home, they should make up problems for themselves, write them in their notebooks, use the calculator to solve them and write down their answers.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 57: Introduction to the Basics of Geometry and Fundamental Shapes

Lesson Learning Objectives:

- To identify geometry as the mathematics of measuring the world
- To be able to identify the names and parts of fundamental geometrical shapes: point, line, angle, triangle and rectangle

Preparation and Materials:

- Chalkboard and chalk
- Scissors
- String or yarn cut into pieces, some about 1 foot long, and some shorter, different lengths. You will need at least 10 pieces.

Opener:

- Introduction: Ask the learners: What is geometry? How is it related to math? (Listen carefully to their responses, since it will tell you how much they know already.)

Activities: 45 minutes

Step 1:

- Share with the learners: We don't live just in a world of numbers, we live in a world of shapes and spaces. By knowing the shapes that make up the world, we can understand more of it.

- The word GEOMETRY is made up of GEO which means earth, and METRY which means measure. So geometry is sort of like the measure of the world, which is made up of different shapes.

Step 2:

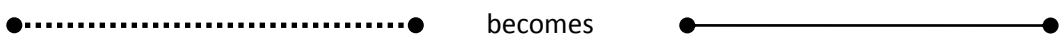
- Ask the learners to identify, draw or name as many geometrical shapes as they know. Write these on the board, along with one drawing of the shape.

Step 3: We are going to build up to these shapes.

- First, draw a dot on the board:
  In geometry, this is called a **POINT**. ●

- Now draw several dots in a row: ●●●●●●●●●●●●

- If we draw many points in a row so close that they touch, we can make a LINE:



- So a line is made up of many many, many points.

Step 4:

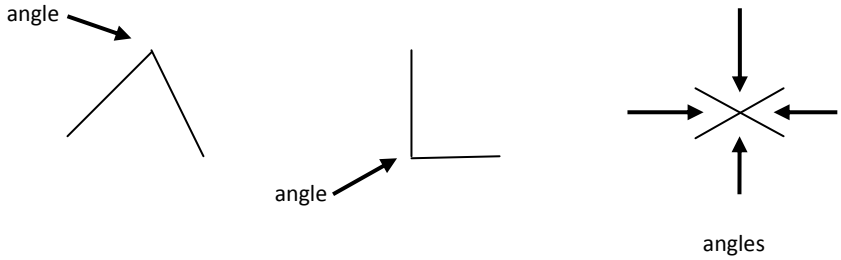
- Take a piece of string about 1 foot long and hold it up, pulling it tight from end to end. This is also a line.

- In geometry, if we connect lines, we can make shapes and spaces. Let's start with 2 lines.

- Take two pieces of string and either hold them straight (learners can help by holding the strings) or lay them on the table.

- What can be made with these two straight lines? (DO NOT curve the strings!!! They must be straight, like sticks.)

MANY arrangements like this can be made, but they never make a complete shape. Instead, where the lines meet or cross, they make an **ANGLE:**



- Angles have a sharp corner on one side, and the other side opens out.

  Some angles are small:

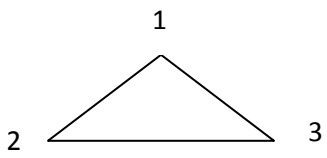
  And some are big:

- Draw some angles on the board and ask the learners to also draw angles in their notebooks, and write the word ANGLE with each one as well.

Step 5: 3 lines

- Now take a third piece of string and lay it out or hold it up. Now we have 3 lines: what can be made by connecting all three lines?

- Let the learners experiment with the strings, and hopefully they will discover they can make a triangle:

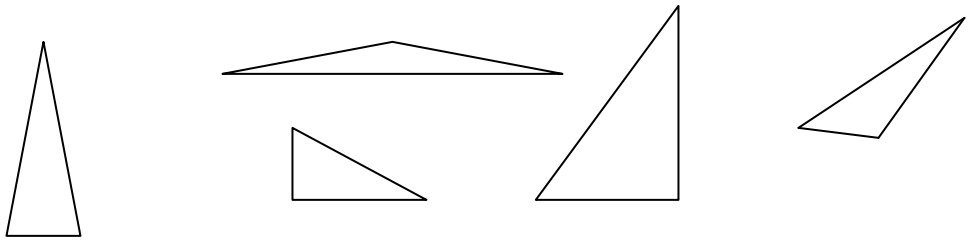


- How many angles are there? There are 3.

- How many sides does it have? It has 3 sides, made of the 3 lines.

- Write TRIANGLE on the board, and point out that the word TRIANGLE is made of TRI + ANGLE. TRI sounds like (and means) '3', so a triangle is made of 3 angles.

- Triangles can have many different looks, but they all have 3 lines, and 3 angles. Draw many triangles on the board, or ask learners to draw them, but make each one different. Also let them experiment with the pieces of string and make sure they use strings that are different lengths.



Step 6: 4 lines

- Now take four pieces of string, 2 long and equal, 2 short and equal and lay them out or hold them up. Now we have 4 lines: what can be made by connecting all four lines?

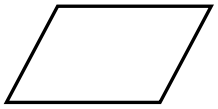
- Many more shapes become possible! After some experimenting, help the learners focus on how to make a RECTANGLE with the string →

- How many angles? There are 4 angles.

- What is special about the angles? They are all the same.

- Ask the learners to identify rectangles in the room around them, and notice that all the corners (the angles) are the same.
  (Door, window, walls, pieces of paper, chalkboard, etc)

- Write the word rectangle on the board for their notes.



NOTE: This shape also has 4 sides, but the 4 angles are not all the same, so this is not a rectangle. (It is a parallelogram.)

Practice:

- The learners should draw at least 4 of each geometrical element studied today, and write the word beside them:
  - Point
  - Line
  - Angle
  - Triangle
  - Rectangle
- Refer learners to the workbook for further practice.

MODULE C

Lesson 58: More Fundamental Shapes: Square and Circle

Lesson Learning Objectives:

- To be able to identify square and circle and the parts of each
- Be able to use skills of observation to identify geometrical shapes in patterns

Preparation and Materials:

- Chalkboard and chalk
- Pieces of string from previous lesson
- Blank paper to cut up into shapes
- Round objects that can be traced to draw circles (such as a can, or a roll of tape)

Opener:

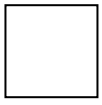
- Write the words Triangle, Rectangle, Line and Point on the board. Ask the learners to read the words and draw the shapes

Activities: 45 minutes

Step 1: Square

- Give one group of learners 4 equal pieces of string and ask them to make a shape that has all equal angles. They should create a square.

- Draw a square on the board and label it SQUARE.



- Now draw a rectangle on the board, label it and ask: What is different between a rectangle and square and what is the same?

- A square has 4 sides that are all the same length. A rectangle has sides of two different lengths. But both shapes have the same size angles (corners).

- There are different sizes of squares and rectangles, but they all have these qualities.

Step 2: Right Angles

- The angle that is in all squares and rectangles is called a RIGHT ANGLE:

- Draw this on the board and label it.

- This is a very common angle! Looking around the room, where can right angles be found? Ask the learners to find right angles in the room. (corners of the room, between wall and ceiling between floor and wall, door corners, corners of books and paper, corners of chalkboard, etc)

- Draw one line on the board and *ask a learner to come up and draw another line to make a right angle*. Draw different lines and do this several times:

- Now *ask the learners to draw several right angles in their notebooks*. The angles can be in any direction:

> **NOTE:** This is a good time to teach learners how to use a straight-edge to draw straight lines: show them how to use the back of a book as straight- edge by holding it down tightly with one hand while using it to guide the pencil to draw the straight line with the other hand.

- Now *ask the learners to each draw one rectangle and one square in their notebooks* and then compare their various drawings. Make sure they are using right angles.

Step 3: Circles

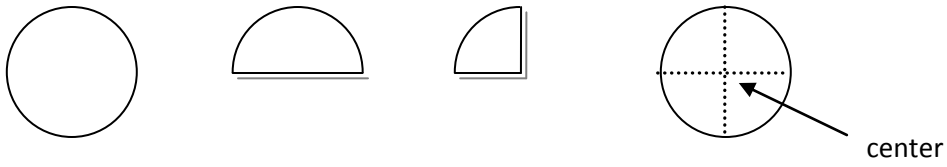
- Tell the learners that not all shapes are made with straight lines, which is obvious, since not everything around us is straight!

- Trace one of the circular objects on paper. Cut it out and hold it up, and make sure that learners know it's a circle. Trace it on the chalkboard and write CIRCLE beside it and the learners should copy this in their notebooks.

- Ask the learners: What is the different between a square and a circle? Let them discuss their observations about sides and angles. (A circle has no straight lines and no angles.)

- Take the paper circle and fold it in half. Then fold that in half again.

- When you unfold it, the point where the folds meet in the middle is the center of the circle.



- Every circle has a center.

- Ask learners to identify circles in the room, or anywhere they can think of. Write the list of circles on the board as they come up with ideas: a cup, a clock, the moon, a ring, the sun, a can, a skillet, etc

Practice:

- At home, the learners should find at least 2 objects that are circles, trace them and cut them out on paper and label what the object was (bucket, cup, can, whatever they used). Then they should fold the papers and find the centers of the circles and label the center.

MODULE C

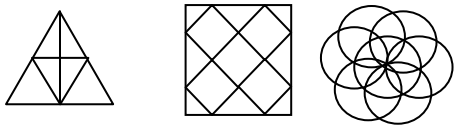
Lesson 59: Finding and Tallying Shapes

Lesson Learning Objectives:

- To be able to identify shapes and use precise observation skills
- To be able to use a table to organize and present information

Preparation and Materials:

- Chalkboard and chalk
- Three prepared drawings, one set per group of 3-5 students (see the Appendix for the drawings to be cut out for the groups)



Opener:

- Draw a circle, square, rectangle and triangle on the board and ask learners to come up and write the names of the shapes underneath each one.

Activities: 45 minutes

Step 1:

- Give each group of learners the set of drawings. Tell them that their task is to figure out how many of each shape is in Drawing A, Drawing B and Drawing C: how many triangles? How many rectangles? How many squares? And how many circles?
  Afterwards, the groups will compare their answers.

- Make sure you point out that sometimes shapes are found inside other shapes! They must look very carefully to count correctly.

- Each group should figure out how to count each shape AND how to keep track of the shapes in each drawing. You can to show the groups how to organize their work in a neat table. For example:

	Drawing A	**Drawing B**	**Drawing C**
Number of Triangles			
Number of Rectangles			
Number of Squares			
Number of Circles			

- Draw this table on the board, and show the learners how to put the correct information in the correct box in the table.

- Give the learners plenty of time to work on this, to organize themselves, count the shapes and use the table to record their answers.

Step 2:

- After all the groups are finished, each group should choose one person to present their group's results.

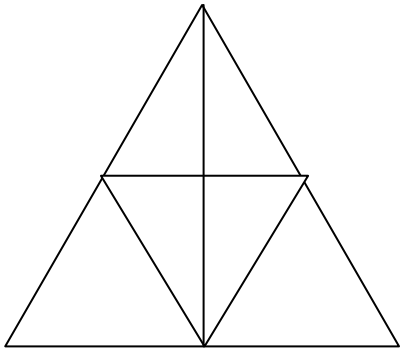
- If other groups got different answers, the presenter must explain how they counted and got their answers, showing the rest of the group.

Practice:

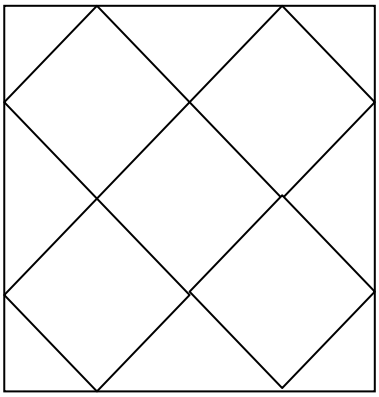
- Ask the learners to make their own drawings that contain different shapes within.

<u>Drawings for Lesson 59.</u>: Cut along the lines and give one set of A, B and C to each group of learners.

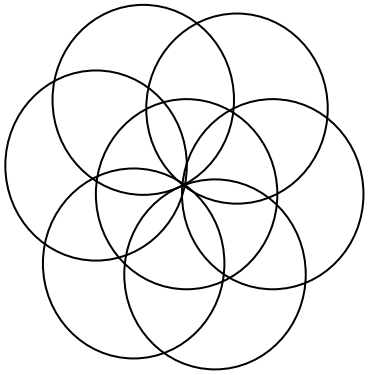
A



B

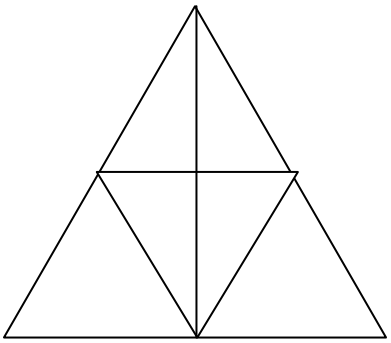


C

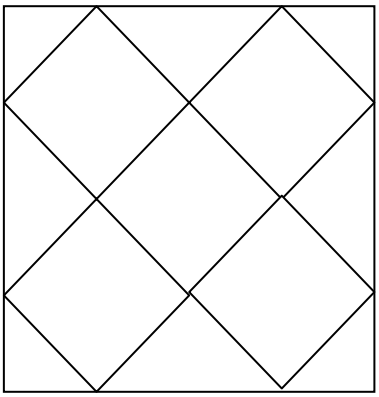


Cut here →

A



B



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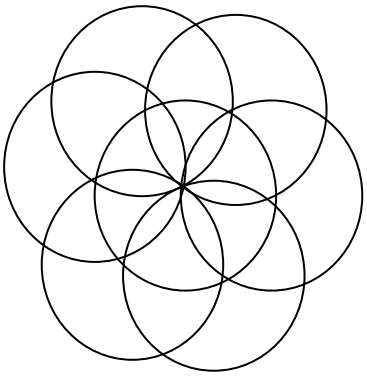
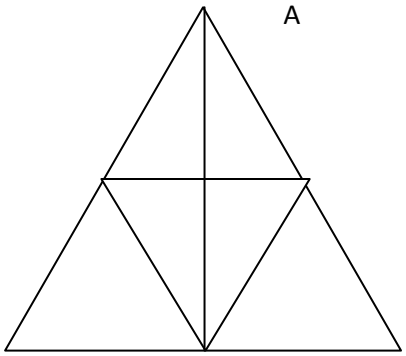
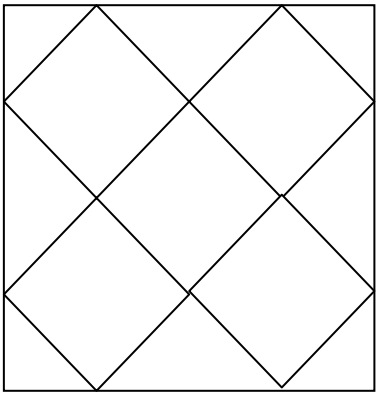


Cut here →

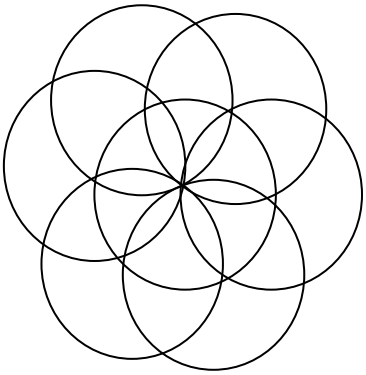
A



B



C



MODULE C

Lesson 60: Introduction to Measurement

Lesson Learning Objectives:

- To tell what, how and why we measure

Preparation and Materials:

- Chalkboard and chalk
- Two rulers (1 foot long)

Opener:

Review subtraction, writing this problem on the board: *Estella has 20 yards of fabric. She cuts 12 yards and gives it to her sister. How many yards of fabric does Estella have left now? [answer = 8 yd]*

- **Activities: 45 minutes**

Step 1: What is Measurement?

- Discuss measurement with the learners: What are some things that we can measure? What does it mean to 'measure' something?

- Measuring something means figuring out "how much". Some things we can measure are :

time temperature weight distance length height amount

- Draw the table on the board and in the "Quantity" column, list the things that can be measured:

Quantity Being Measured	**Tools used for measurement**	**Units of measurement**
Time		
Temperature		

Weight		
Distance		
Length		
Height		
Amount		

Step 2: Tools for Measurement

- **Ask:** HOW do we measure things? To measure, we need some sort of a measuring tool. To measure something means we can use a NUMBER to describe something physical.

- For example, to measure time, we use a clock or a watch.

- Write this in the "Tools Used for Measurement" column:

Quantity Being Measured	**Tools used for measurement**	**Units of measurement**
Time	Clock, watch	

Step 3: Units of Measurement

- **Ask:** How do we COMMUNICATE a measurement? We use units of measurement. For example, what is a unit of measurement for measuring time on a clock? Hours, minutes.

- Write this in the "Units of measurement" column of the table:

Quantity Being Measured	**Tools used for measurement**	**Units of measurement**

Time	Clock, watch	Hours, minutes, seconds

Step 4: Completing the Table

- Now the work of the learners is to complete the rest of the chart. You can assign one or two quantities to each small group of learners and they should discuss the Tools and Units for the Quantities they were given.

- They should then write their answers in the chart, presenting to the rest of the class, to see if the class agrees or has other ideas.

- Below are some ideas for answers for the chart. The learners may come up with many more. What is important is that the tool used can produce *numbers* and that the units of measurement are *standard units*, which can be understood by everyone.

Quantity Being Measured	**Tools used for measurement**	**Units of measurement**
Time	Clock, watch	Hours, minutes, seconds
Temperature	Thermometer	Degrees
Weight	Scale	Pounds, kilograms, ounces
Distance	Car	Miles, kilometers
Length	Yardstick, ruler	Yards, feet, inches
Height	Yardstick, ruler	Yards, feet, inches
Amount	Measuring cup, jug	Gallon, quart, pint, cup

Step 5: Standard Units

- **Ask the learners:**
  - If someone measures a cup of rice here and someone measures a cup of rice in Ghana, will it be the same amount of rice? [yes]
  - Is one hour in Liberia the same as one hour in Togo? Is it the same as one hour in America?
  - If you buy 3 yards of fabric in Monrovia, is that the same as 3 yards in Gbanga?

- Yes to all of these! These are called standard units of measurement. They mean the same thing all around the world.

- If they were not standard, and one cup meant different amounts in Liberia and Ghana, there would be problems!

- Ask one learner to 'measure' the length of a desk or table in the room using the side of his or her hand and write it down. Then ask someone else to do the same and compare their answers and compare the size of their hands. Because they are not the same, hands can NOT be used for standard measurement!

- Show that two rulers are exactly the same size. They are standard units that can be used everywhere and mean the same thing.

Practice: ☺ **Discussion:**

- What are some things we CANNOT measure?
  (non-physical things like happiness, hunger, love, fear, pain, joy…)

- This is why it is often hard to talk about things like this in ways that people can understand: because these things do not have any tools to be measured and no standard units of measurement.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 61: Measurement of Time – Units of Time

Lesson Learning Objectives:

- To demonstrate details of how time is divided

Preparation and Materials:

- Chalkboard and chalk
- A large diagram of the Triangle of Time (see next page, as well as the Appendix)
- A clock or watches, if learners have their own

Opener:

- Draw a clock on the board showing the time 5:37, and ask the learners to write down the time it shows.

Activities: 45 minutes

Step 1:

- What is the smallest unit of time we can measure? **A Second.**

- What is the next biggest unit of time? **A minute.**
  - **60 seconds equals 1 minute.**

- What is the next biggest unit of time? **An hour**. How many minutes are in 1 hour?
  - **60 minutes = 1 hour**

- What is the next biggest unit of time? **A day**. How many hours are in a full day and night?
  - **24 hours = 1 day and night**

- What is the next biggest unit of time? **A week**. How many days are in a week?
  - **7 days = 1 week**

- What is the next biggest unit of time? **A month**. How many weeks are in a month?
  - **4 weeks = 1 month**

- What is the next biggest unit of time? **A year**. How many months are in a year?
  - **12 months = 1 year**

- How many days are in one year? **365 days = 1 year**

Step 2: The Triangle of Time

- Show the learners the chart on the following page (you may wish to make it on a bigger piece of paper first, or cut it out from the Appendix) and ask them:
  How does this Triangle of Time show that <u>seconds</u> are less time than <u>days</u>?

  How does it show that <u>months</u> are more time than <u>weeks</u>?

- You can write in each layer of the triangle how many of each layer make up the next layer. For example, in the Hour layer, you can write "24 hours= " and then in the Days layer write "7 days = ", etc. Let the learners work with the Triangle.

Triangle of Time

Step 3: Reviewing Telling Time

- Review how a clock is marked: What do the numbers mean? [**the hours**] And which hand of the clock tells the hours? [**the short hand**]

- What do the small marks mean? [**the minutes**] And which hand tells the minutes? [**the long hand**]

- How many minutes are in an hour? [**60**] How many

hours are in a day? [**12 day, 12 night**]

- Draw a clock on the board showing a time , such as : 9:07
  and ask the learners to write the time properly:

> **NOTE:** Make sure the learners are using the proper notation with the : mark in between the hours and minutes.

- Write several practice clocks on the board. The learners should read and write the times.
- Check their work and review any difficulties the learners have with telling time on a clock.

Practice: Draw clocks that show the following times:

4:15 6:30 10:00 2:45 3:28 11:50

- Refer learners to the workbook for further practice.

MODULE C

Lesson 62: Measurement of Time – Digital Clocks

Lesson Learning Objectives:

- To be able to use a digital clock to tell time

Preparation and Materials:

- Chalkboard and chalk
- A clock
- A digital clock or watch

Opener:

Draw a clock showing the time 5:37 and ask the learners to write the time properly. Make sure they use the proper notation.

- **Activities: 45 minutes**

Step 1: Analog clocks

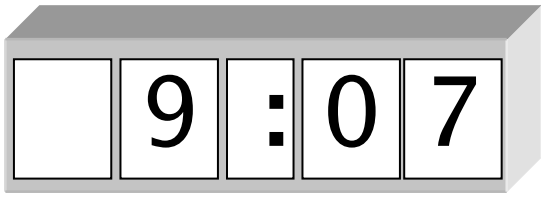
- Draw a clock on the board to answer the Opener question and also show the regular clock.
- Explain that this kind of clock with hands that go around the 12 numbers is called an **analog clock.** Analog clocks were invented hundreds of years ago, before there was electricity.

Step 2: Digital clocks

- In 1956, a new type of clock was invented. It does not use hands, but only shows the numbers time of day. It measures time using the same standard units of seconds, minutes and hours, but it shows the time in a different way. These clocks have to have electricity or batteries to run.

- A digital clock shows the time of the day the way you have learned to write the time.

  This is an analog clock: A digital clock would show the time this way:



- Show the digital watch, if you have one, and point out the hours and the minutes shown. Read the time on the digital watch out loud, and draw an analog clock showing that time

Step 3: Time dictation

- Say the following times out loud and slowly. The learners should write the times as they would appear on a digital clock:
  - **five thirty**
  - **eight twenty-six**
  - **two ten**
  - **twelve forty-three**

- Answers: Check their work

  5:30 8:26 2:10 12:43

- They should then draw analog clocks that show those times.

Step 4: a.m and p.m.

- Just like with analog clocks, we have to write a.m. for times that are in the morning, and p.m. for times that are in the evening. Review these with the learners.

Practice: **Write these questions on the board and ask the learners to answer them:**

1. If you have an appointment at 10:30, and you arrive at 10:24, are you late or early?
2. Your bus is supposed to leave at 2:05. You arrive at 1:58. Did you miss the bus?
3. Your sister works from 8:00 a.m. to 1:00 p.m. How many hours does she work?

☺ **Discussion:**

- What are some advantages and disadvantages of analog clocks?
- What are some advantages and disadvantages of digital clocks?
- Refer learners to the workbook for further practice.

MODULE C

Lesson 63: Introduction to Reading Scale Intervals: Preparation for Thermometers

Lesson Learning Objectives:

- To be able to read scale intervals

Preparation and Materials:

- Chalkboard and chalk
- Scissors and blank paper

Opener:

- Write the following numbers on the board and ask the learners to complete the pattern:

  2, 4, 6, __, __, 12, __, __, 18, __

Activities: 45 minutes

Step 1: Review of skip counting and reading scale intervals

- Review with the learners to skip count by 2's, 5's, and 10's. Do this on the board and out loud:

2 4 6 8 10 12 14 16 18 20 22 24…

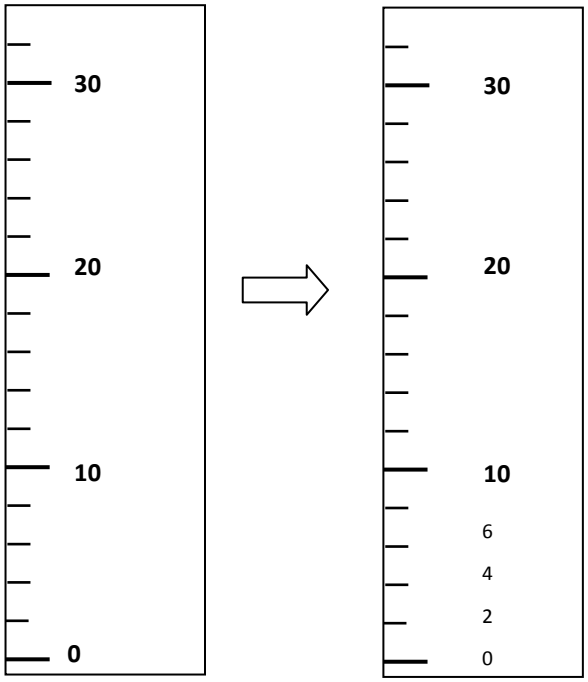
5 10 15 20 25 30 35 40 45 50 55 60…

10 20 30 40 50 60 70 80 90 110 120 130…

Step 2:

- Now show learners the diagram on the next page. The dark lines are counting by 10's, and the smaller lines between are counting by 2's. But numbers are not written by the smaller lines. So you have to count by 2's to know what each small line is: 0 2,4,6,8, 10, 12, 14, 16, 18, 20, 22, 24,26, 28, 30, 32.

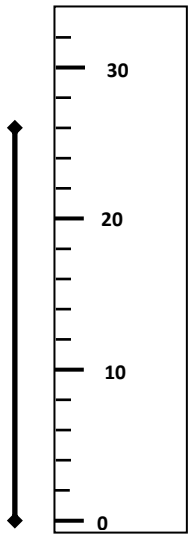
- Count and write the numbers by the smaller lines. The first ones are done for you:



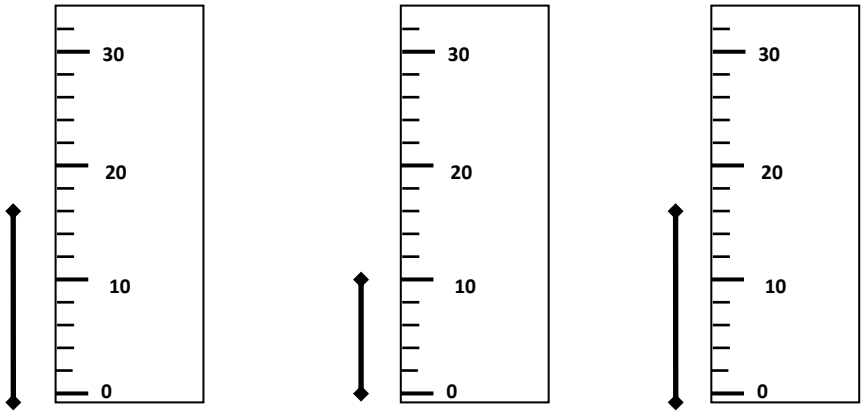
Step 3: Using the Scale Interval for Reading

- If a line is drawn along the end of the numbers, you have to be able to figure out what the number is where the line stops.

For example: This line starts at 0 and ends at 26

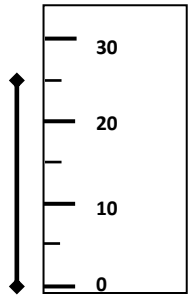


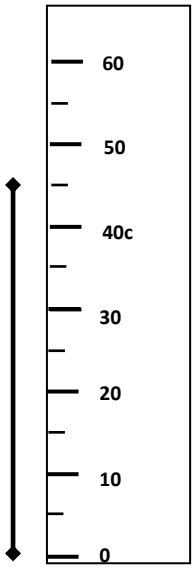
- Draw a scale like this on the board and give several examples of lines, and the learners should tell you where the line is stopping:

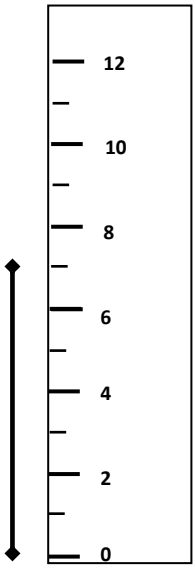


Step 4: Other Scale Intervals

- Sometimes scales count by 5's, or show other numbers. Practice figuring out these scales and reading the line beside them. Draw different lines to practice reading at different points:







Practice:

- Cut out strips of paper and have the learners make scales like these using different intervals and then practice reading different points on the scales.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 64: Measuring Temperature

Lesson Learning Objectives:

- To be able to read a thermometer
- To show important temperature benchmarks such as body temperature, the boiling and freezing point of water, etc.

Preparation and Materials:

- Chalkboard and chalk

Opener:

- Write the pattern on the board and ask the learners to complete it:

  1, 4, ___, 10, ___, 16, 19

Activities: 45 minutes

Step 1: What is temperature?

- The temperature of something obviously tells us how hot or cold something is. We usually use our sense of touch to tell the temperature, but if we want to be more accurate, we have to use a **thermometer** to measure temperature.

Step 2: How does a thermometer work?

- A thermometer is made of a small tube with a liquid inside. When liquids get hot, they expand or get larger and so the liquid goes up the tube if the thermometer is measuring something hot. As the temperature increases, the liquid moves up the tube.

- If it's cold, as the temperature goes down, the liquid inside gets smaller and shrinks and goes down the tube.

- There are numbers on the thermometer. The number where the liquid stops tells you the temperature.

(see the larger picture that is in the Appendix)

Step 3: Units

- Temperature is measured in degrees. In Liberia, we use Fahrenheit degrees. (In other countries, they use Celsius degrees.)

- Degrees are written with a little circle after the number. For example, if the temperature outside is 85 degrees, it is written 85°F.

Step 4: Common temperatures

- It is important to know certain temperatures. For example:

  - Normal body temperature is a little bit more than 98°F. If someone's temperature is more than that, then they have a fever. It means their body is fighting an illness. For children especially this is dangerous.

  - Water boils at 212°F. This is when steam forms.

  - Water freezes at 32°. This is when ice forms.

  - In Liberia, the temperature can get as high as 97°.

  - The coolest it gets in Liberia is about 68°F.

  - The hottest place on earth where people live is El Azizia where it can be 136°. Deserts are the hottest places on earth.

  - The coldest places on earth are where it snows, on mountain tops and at the very far north and south ends of the earth. In these places, the temperature is sometimes too cold for a thermometer to even work!

Practice:

- Write the important temperatures on the board (from the notes above.)
- For homework, the learners should try to find out what the temperature is for the day and write it with the date in their notebook. They may find the information in the newspaper or on the TV news or radio.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 65: Measurement of Length – Standard and Non-Standard Units

Lesson Learning Objectives:

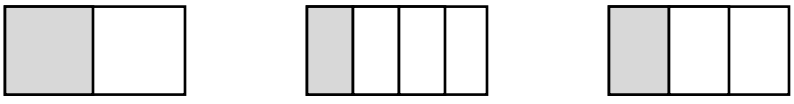
- To tell the need for standard units
- To be able to measure using inches

Preparation and Materials:

- Chalkboard and chalk
- A ruler
- Pieces of string cut into 1 inch lengths, one for each learner
- Small items to measure in inches, such as combs, etc.
- Rulers (or paper rulers cut from the appendix)
- 6 inch ruler:

Opener:

- Review fractions: Draw these on the board and ask learners to identify the fraction that is shaded:



Activities: 45 minutes

Step 1: Non-standard units

- Ask the learners to measure the length of their notebooks. Don't give them any instructions on how to do it.

- After they're done, write and compare their answers on the board. Discuss the different methods people used.

- Now give each learner one piece of 1 inch string. (Don't tell them it's an inch.) Now ask them to use the string to measure the length of their notebook using this string as the unit of measurement: how many 'strings' long is their notebook?

- Again record their answers on the board and compare to their earlier answers.

- Discussion: the first method was using non-standard units, since people did their measuring differently.

- The strings were all the same size, so they were standard units.

Step 2: The Inch

- Tell the learners that the strings were 1 inch long. The inch is a standard unit. Write this on the board.

- What are some items that would be good to measure using inches? Ask the learners. They should mention small items such as paper, length of a pencil, length of a picture, etc.

- Demonstrate a ruler, showing the large markings at each inch. Demonstrate how to measure an item with the ruler.

> **NOTE:** At this point, show the learners how to measure to **whole** inches. Do not yet try to teach fractions of inches, unless they express a great interest.

- Show how to write down the length of a measured item using the abbreviation

for inches. For example, if a comb is 6 inches long, it would be written comb = 6 in.

- Also show that inches is written with the symbol " . For example, comb = 6 "

- Give each learner a ruler or a paper ruler and ask them to measure the length of 4 small items in class and write them neatly in their notebooks. They should compare their measurements with other learners.

Step 3: A physical inch on the body

- Have each learner use an inch string to find a place on their hand that is the same length. It may be the length of a knuckle, or a fingernail. Tell them to find that place on their hand to use as their own 'ruler' in order to estimate an inch.

Practice:

- Learners should take home their ruler and measure at least 5 more small items at home, writing down the items and the measurements.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 66: Using Feet and Inches

Lesson Learning Objectives:

- To indicate the relationship between feet and inches
- To be able to measure objects in feet and inches

Preparation and Materials:

- Chalkboard and chalk
- Pieces of string cut into 1 inch lengths
- Pieces of string cut into 1 foot lengths
- A ruler (one foot)
- Paper inch rulers from previous lesson
- A selection of objects to measure

Opener:

- Ask learners how tall they are and ask them to write it down. Listen carefully to how they measure themselves, if they know how tall they are!

Activities: 45 minutes

Step 1: From inches to feet

- Give the learners the 1 inch pieces of string and ask them to measure a larger item such as a bench or a door or window using the strings.

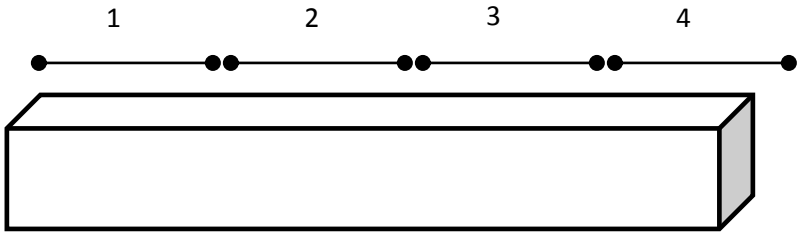
- They will find this difficult and annoying. At this point, offer them the foot-long strings to use instead.

- As they measure the long objects using the long strings, you will have to show them how to estimate or round lengths to the nearest whole long string.

For example:

- In the picture below, the box is not exactly 4 strings long, but it is closer to 4

strings than it is to 3 strings, so we can say the box is approximately 4 strings long.



- They should measure and write down 2 or 3 measured objects using the strings.

Step 2: The Foot

- These long strings are a standard unit: the foot. Write this on the board. Explain that if there is more than one foot, we say and write feet. The abbreviation for both is ft.

- Write some of the learners' previous measurements from above, on the board but using feet: example: bench = 4 ft

- Also show that the symbol for feet is ' . For example, bench = 4 '

Step 3: Feet and Inches

- Collect 12 small strings and put them end to end. Then put a long string beside them, and show that 1 long string (a foot) is equal to 12 small strings (inches):

  ——————————————

  ————————————

- Write on the board: 12 inches = 1 foot

Step 4: Measuring

- Use the rulers to measure a variety of objects, small and large. Practice using the correct units and writing the measurements properly.

Step 5: A physical foot on the body

- Ask the learners to use a string and find a place on their body that is equal to a standard foot. It might be the length of their forearm, or both hands together, etc. This will be how they can remember how big a foot is.

Practice:

- If there is not time to do enough practice in class, the learners should take string or rulers home and measure more objects at home.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 67: Using Yards and Feet

Lesson Learning Objectives:

- To show the relationship between feet and yards
- To be able to measure in feet and inches and yards

Preparation and Materials:

- Chalkboard and chalk
- Pieces of string 1 foot long from previous lesson
- Pieces of string 1 yard long
- A yardstick or tailor's tape measure

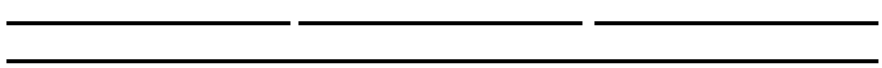
Opener:

- Review multiplication: Write the following problems on the board for the learners to answer:
  5 x 7 = **4 x 3 =** **6 x 2 =** **5 x 4 =** **8 x 3 =**

Activities: 45 minutes

Step 1:

- Ask the learners to measure the length of the classroom in feet. After they have tried, now give them the yard long string to measure the room.
- Explain that the long string is the standard unit the yard. It is abbreviated yd. Write their measurement of the room on the board in yards: For example: **room = 5 yd**
- Introduce the longer string, the yard, as being equal to 3 foot-long strings:

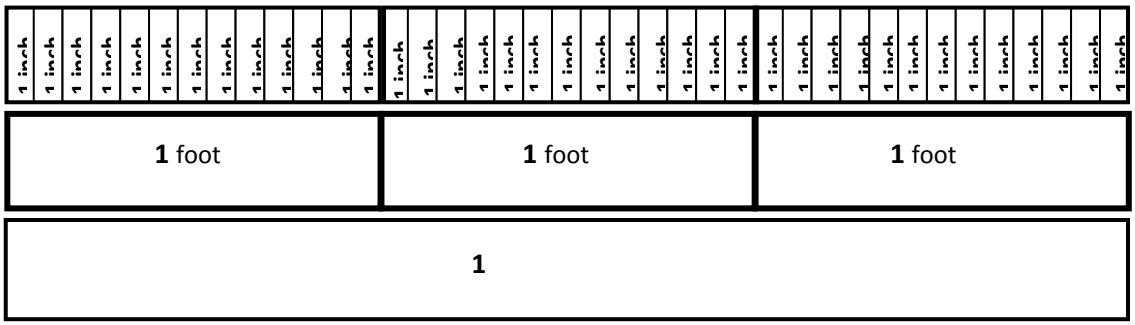


- Write on the board: **3 feet = 1 yard**
  In addition, **36 inches = 1 yard**
- Use the yardstick to show the 3 feet as well as the 36 inches.
- Learners should use the strings to find a yard on their body. It is often the length from one's nose to the tip of the fingers, but will be different for different people.

Step 2:

- Show the diagram below to show the relationship among inches, feet and yards. Ask learners to look carefully at the diagram and share any observations they have about it. If possible, put the diagram on the wall for reference.

Inches, Feet, Yards Diagram



Practice:

- The learners should measure small, medium and large objects using the appropriate units of inches, feet or yards, rounding to the whole unit. They can go outside and measure parts of the building or their classroom, etc, as well as small objects in and around the classroom.
- They should record every object and measurement they make, and compare with

anyone else who measures the same object.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 68: Miles and Practice with Measurement and Estimation

Lesson Learning Objectives:

- To be able to show the relative size of a mile
- To be able to choose appropriate estimates of lengths

Preparation and Materials:

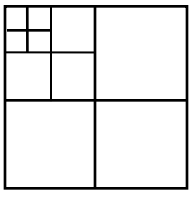
- Chalkboard and chalk
- Poster of measurement triangle
- Prepared cards, as shown below. (see Appendix for pre-made cards to cut)

From Monrovia to Gbanga	50 miles	Height of a man	6 feet
Height of a door	7 feet	Length of a potato	4 inches
Height of a 3 year old child	1 yd	Length of a fish	8 inches
Length of a book	10 inches	Size of a TV	2 feet
Length of a football field	100 yards	From Harper to Kakata	200 miles
Height of a tree	5 yards	The distance to cross a river	20 yards
Length of a table	5 feet	The size of a paper clip	1 inch
Length of $1 bill	6 inches	The backseat of a taxi	4 feet

Opener:

- Write these instructions on the board: "Draw a square. Divide the square into four equal squares. Divide one of those squares into four equal squares. Continue this until you can't make any more small squares."

It should look something like this →



Activities: 45 minutes

Step 1: Miles

- Ask learners: If you had to measure the distance from Monrovia to Gbarnga, would you want to use inches? Feet? Yards? No, all are much too small! This is why the standard unit of miles is used.

- A mile is so long that we can't make it out of string, obviously. **A mile is equal to 1760 yards**.

- A mile is about how far you can walk in about 20 minutes, walking not too fast or too slow.

Step 2: Relationships among the standard units

- Give the cards to the learners. Their task is to sort and match the cards, matching the object with an appropriate measurement.

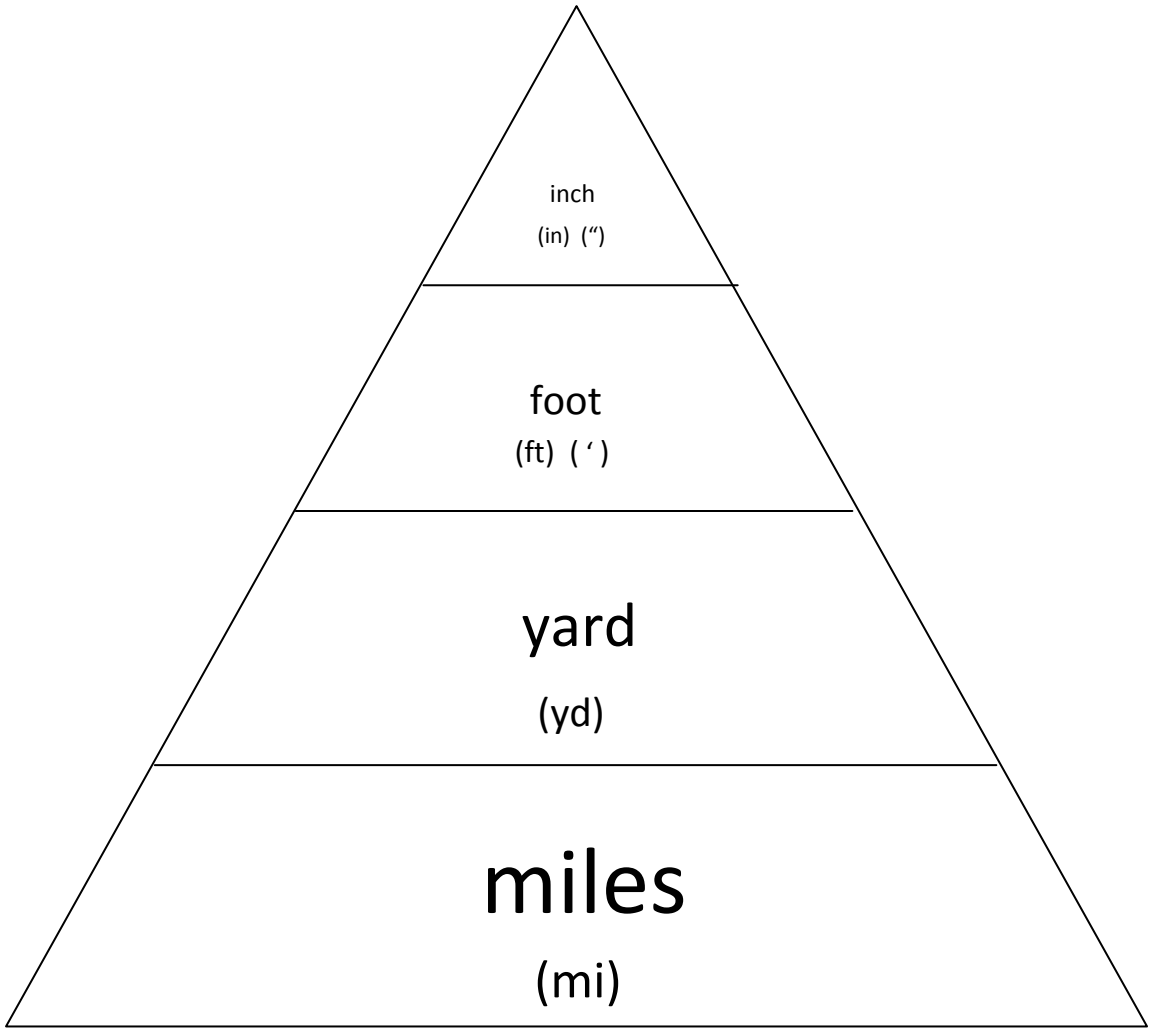
  For example, **length of a pencil** should NOT be matched with **6 feet**.

Practice:

- Put up the Measurement Triangle poster (next page), and discuss what it shows.

Measurement Triangle – Cut out and post on the wall.

[also found in the Appendix]



MODULE C

Lesson 69: Measuring Weight - Pounds

Lesson Learning Objectives:

- To show pounds are the standard unit of weight
- To show some important benchmark weights

Preparation and Materials:

- Chalkboard and chalk

Opener:

- Review addition: Write the following problems on the board for learners to solve:
  13 + 54 = **46 + 38 =**

Activities: 45 minutes

Step 1: Weight – what is it?

- Ask the learners what things they buy in the market that they buy in **pounds**. Write this list of items on the board. It may include vegetables, rice, potatoes, etc.

- Point out that all of these things are solid objects – they are not liquids like kerosene or oil, etc.

- Weight measures how heavy something is.

- To measure the *weight* of something, how heavy it is, the standard unit used in Liberia is **pounds**. The abbreviation or short way of writing pounds is **Lb**. Write this information on the board for the learners to copy into their notebooks:

- We measure weight in pounds. Pounds are written as Lb. **Example: 10 Lb (10 pounds)**

- In Liberia we use pounds, but most other countries use **kilogram** for measuring weight. It is written **kg**. You may see it sometimes on bags of food that comes from other countries.

- A kilogram is **heavier** than a pound, about double, or two times, the weight of a pound.

How do we measure it?

- How is weight measured? With a scale. It is like an equals sign: the weight on one side equals the amount on the other, If the scale is balanced.

- Ask the learners: about how many oranges are in one pound? About how many potatoes are in one pound?
- After much experience buying things in a market, we often have a 'feel' for what

a pound feels like. But a scale is used to make it exact and correct.

- Some weights are important to know. For example, approximately how many pounds should a healthy newborn baby weigh? [answer: about 7 pounds] If a baby is too small when it is born, it may have health problems. This is why nurses, doctors and midwives weigh a baby when it is born.

Step 2: Estimating foods and recipes

- Ask learners to work in small groups and pretend they are planning for a celebration for 20 people. They should decide what they are going to cook and serve the guests.

- They must then make a list of foods they need and **how many pounds** of each they will need.

- They can also begin to figure out how much it will all cost. Make sure they write it down!

- Give the learners plenty of time to do this activity, to make their list of foods and the weights of food needed and how much it will cost.

- If there is time at the end of class, the groups can present to the whole class their plans for the 'celebration'.

Practice:

- At home, learners should look on packages of food and see if they can find the Lb or pound label, and write down what they find. (for example: 1 pound of beans, etc.)

MODULE C

Lesson 70: Measuring Weight - Ounces

Lesson Learning Objectives:

- To tell the relationship between ounces and pounds

Preparation and Materials:

- Chalkboard and chalk
- Two one-pound bags of sand or rocks or (something like that which can be divided easily into smaller amounts)
- Newspaper or other scrap paper to cover the table
- Blank paper
- Small containers or bags or pieces of cardboard

Opener:

- Review division: write the following problems on the board for learners to solve:

20 ÷ 5 = 16 ÷ 2 = 35 ÷ 7 = 12 ÷ 4 =

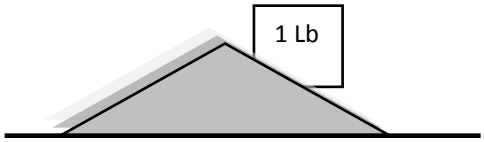
Activities: 45 minutes

Step 1: Pounds and Fractions of Pounds

- Pounds are nice to use when we want to buy large amounts of things – 5 pounds of potatoes, 10 pounds of rice, etc. But what about when we don't want to buy so much? *Ask the learners how they would ask for only a small amount of something.*

- We could say 'half a pound' or '1/4 of a pound' to start with.

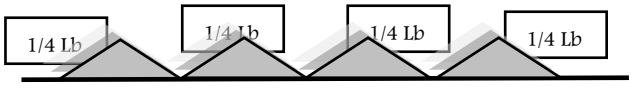
1. Show the pound of sand. If possible, put newspaper on the table and then pour the sand out onto a piece of cardboard on the table. Write **1 Lb** on a piece of paper and stick it in the sand. Let learners lift and feel **one pound**.



NOTE: This lesson is a good time to review fractions.

2. Now split the pile of sand into two equal piles on pieces of cardboard. Each pile is now **½ Lb**. Write this on two pieces of paper and stick in the sand piles. Let learners feel **half a pound.**

3. Now split each pile into two more equal piles. Each pile is now **¼ Lb**. Write this on four pieces of paper and stick in the sand piles. Let learners feel **one-fourth of a pound**.



Step 2: Ounces

- In fact, there is another unit of measurement that we can use that is smaller than a pound. It is an **ounce**. It is written **oz** for short.

- To see how heavy one ounce is, divide the piles two more times again, as you were doing, until you have **16** small equal piles:

Each of these small piles is 1/16 of a pound, or **1 ounce**.

1 pound = 16 ounces [1 Lb = 16 oz] Write this information on the board for learners to copy.

- One the back of the paper where you wrote 1/16 Lb, write **1 oz**.

- Carefully place an ounce of sand on a piece of paper or in a learner's hand so they can feel what one ounce weighs. Then let them feel the other full one-pound of sand to compare:

Step 3: Which one to use?

- What kinds of things are measured in ounces? [small amounts of things, like medicine, spices…]

Practice:

- At home, learners should again look on packages and containers and look for where the weight is written in ounces (oz). Ask them to copy into their notebooks any that they find.

MODULE C

Lesson 71: Measuring Volume (Capacity) – Gallons, Quarts and Pints

Lesson Learning Objectives:

- To show the concept of capacity (volume)
- To tell the relationship between gallons and quarts

Preparation and Materials:

- Chalkboard and chalk
- A bucket
- A gallon jug
- A quart jug
- A pint container
- Water to fill the various jugs

Opener:

- Review: What are standard units? What does it mean, why do we have them? Give some examples.

Activities: 45 minutes

Step 1: What is volume?

- Ask learners, if you want to buy some kerosene, how do you ask for it? If someone wants to buy petrol for their car, how do they measure it? If you want to sell milk, what units do you sell it in?

- All of these should have answers of **gallons** or **quarts**.

- And what do all of these things have in common: kerosene, petrol, milk – they are all **liquids**.

- To measure liquids, we don't measure how heavy they are, we measure how much of it there is. How much room they take up. How much of a container they fill up. This is called **volume**.

Step 2: How do we measure volume?

- There is not a specific tool or instrument to measure volume like a scale or a thermometer. Instead, volume is measured in certain size containers that are the **standard units**.

Step 3: What are some standard units of volume? Gallons and quarts

- Show the gallon jug, write **1 gallon** on a piece of paper and put it on the jug where everyone can see. Write on the board: **A gallon is a standard unit of volume**.

- Show the quart jug, write **1 quart** on a piece of paper and put it on the jug where everyone can see. Write on the board: **A quart is a standard unit of volume.**

- **How many quarts are in a gallon?** If possible (if you have water there), ask the learners how many quarts are in one gallon? They should fill the quart jug with water and then use it to fill the gallon jug, and see how many quarts it takes to fill the gallon jug.

  Answer: 1 gallon = 4 quarts. Write this on the board.

Step 4: Pints

- Show the pint container, write **1 pint** on a piece of paper and put it on the container where everyone can see. Write on the board: **A pint is a standard unit of volume**.

- How many pints are in a quart? Let the learners figure it out.
  Answer: 1 quart = 2 pints. Write this on the board.

Step 5: Health facts related to volume of liquids in our body

- The following facts are in the Appendix. Cut them out and share them with the learners. Ask the learners to read each one and discuss.

☼**FACT:** A healthy adult has almost **6 quarts** of blood in his/her body.

☼**FACT:** If we don't drink enough water, we can get headaches, be in a bad mood, and feel weak. Adults should try to drink **one glass of water every hour**. This is almost **1 gallon** of water every day! It is very good for our health. (Children also need to drink a lot of water every day.)

☼**FACT:** Our body needs water to live. If we do not have enough water, the body will die. This is why children who have diarrhea MUST be given extra water to drink, because they are losing too much water from their body from the diarrhea. Anyone who has diarrhea **must** drink even MORE water.

☼**FACT:** Our body loses water through breathing. We lose almost **one quart** of water from our body every day just through breathing. If you hold your hand close to your mouth and breathe on it, you can feel the water in your breath.

Practice:

- At home, learners should look at any containers of liquids they have, such as oil,

kerosene, etc, and look on the labels for units of gallons, quarts or pints. They should write down what they find.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 72: Using Volume Units to Make Oral Rehydration Solution (Cups, Ounces)

Lesson Learning Objectives:

- To show the relationship between volume units including cups, pints and quarts
- To be able to use volume measurements to make Oral Rehydration Solution

Preparation and Materials:

- Chalkboard and chalk
- Jug
- Measuring cup
- Water
- Sugar
- Salt

Opener:

- Review: How many pints are in a quart? How many quarts are in a gallon? How much water should we drink each day and why? If a person, especially a child, has diarrhea, what should they do? [drink a lot of water to make up for the water being lost from their body]

Activities: 45 minutes

Step 1: Pints and Cups

- Review that for measuring liquids, we use standard units of volume, which measure how much liquid there is.

- For review, write on the board:
  1 gallon = 4 quarts
  1 quart = 2 pints

- A smaller unit than pints is a **cup**.

- Set out the pint container, and the measuring cup. Ask the learners how many pints are in 1 cup? Let them figure it out.

- **1 pint = 2 cups** Add this information to the list on the board:
  1 gallon = 4 quarts
  1 quart = 2 pints
  1 pint = 2 cups

Step 2: Ounces – for volume

- In an earlier lesson, we learned that a standard unit for weight is **pounds** and that one pound is equal to 16 **ounces**. We saw that an ounce was the weight of a little pile of sand.

- However, the same word, **ounces**, is also used to measure liquids in volume. When measuring liquids, there are **8 ounces in 1 cup of liquid.**

> **NOTE:** We often say, "Give me a cup of water." This is casual use of the word 'cup'. But a *standard cup* is exactly 8 ounces. A casual "cup of water" may be more than 8 ounces, or less than 8 ounces.

Step 3: Using measurements for an important recipe

- As we talked about in the last lesson, the body needs water, and if someone has diarrhea, they must drink more water to replace the water lost in the diarrhea. The body also loses other things it needs when it is sick with diarrhea. For this

reason, water is good, but water with some other things in it is better for the body. The body needs salt and sugar, as well as water.

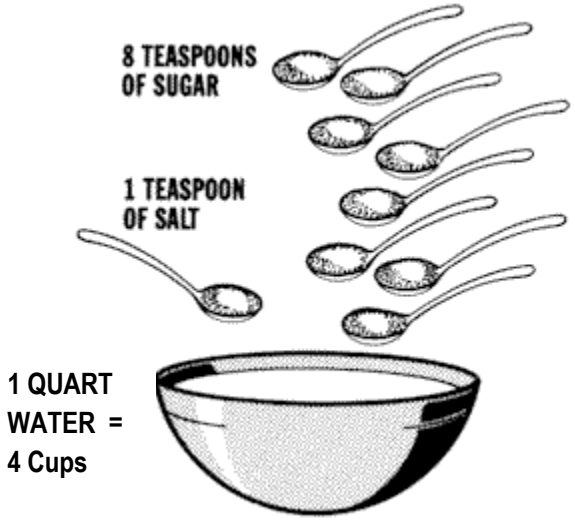
- We are going to use measurement to make a drink that is perfect for adults and children with diarrhea. It is called Oral Rehydration Solution (ORS). Anytime anyone has diarrhea, you should make this for them and make them drink it. It can save their life!

Step 4: The Recipe

- Write this recipe on the board or on a poster paper and give the learners time to copy it down. Then make the ORS as a class.

How to make ORS for someone with diarrhea

1. You will need: a cup measure, a quart measure, a jug or large bowl, a teaspoon, sugar, salt and water
2. Wash your hands and wash the jug and cup and spoon.
3. Boil the water if it is not clean. Let it cool.
4. Pour **one quart of water** into the jug.
5. Add 2 ounces of sugar (8 teaspoons)
6. Add 1 teaspoon of salt
7. Stir, and then give to the sick person. Give them a cup after each time they have to go to the toilet. Let them drink it slowly, but they should drink a lot of it.



Practice:

- At home, talk to the rest of your family or your neighbors about ORS and what to do when someone gets diarrhea and why.

MODULE C

Lesson 73: Proportional Drawing and Map-Making

Lesson Learning Objectives:

- To be able to draw a simple map using proportional drawing

Preparation and Materials:

- Chalkboard and chalk
- Yardsticks, rulers

Opener:

- Ask learners to choose one object in the room and draw it in their notebook. It can be the trashcan, a book, a desk, a window, a bag – anything at all that they want to draw.

Activities: 45 minutes

Step 1: Drawing

- Use the drawings that the learners did in their Opener. Ask them to discuss if it was hard or easy and how accurate are their drawings?

- Emphasize that to make their drawing accurate, they must draw the same shapes with the same relationships among the pieces. For example, if drawing a door, the door must be taller than it is wide, or else it won't look like a door.

- Afterwards, the learners may share their drawings if they want, or try to draw something else.

Step 2: Maps

- Ask the learners how they would define a map. Have a discussion on what maps are used for and how they are useful. Maps are simply pictures of where places are.

- Today we are going to make a map of our classroom.

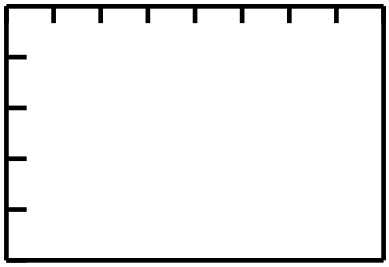
- Do this process together as a whole class at first, either on the board or on a large piece of paper.

Step 3: The Process

1. Start by measuring the length and width of the classroom in yards. Write it down.
   Example: 8 yards long and 5 yards wide.

2. You must now make marks on the paper so there are 8 units on the long side of the paper and 5 units on the short side. They MUST be the same size!! Each of these units represents **one yard** →

   Now you have a picture of the size of the classroom.



3. Now you must add the elements of the classroom, but in the right places.

   - Decide where the front of the room is on the paper.
   - Where is the door? Measure how far it is from the wall, draw it and label it.
   - Where is the chalkboard? How long is it? Draw it and label it.
   - Where are the chairs or benches or tables? Measure and draw them on the map.

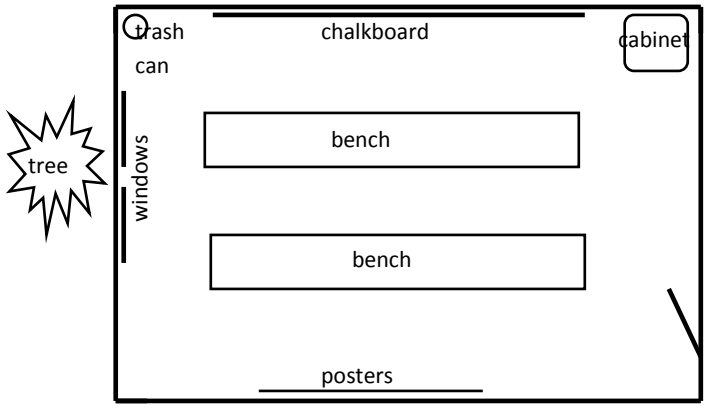
> **NOTE:** During this process, ask the learners these questions and let them figure it out, but help them, and do it with them as well.
> *Once the learners understand the process, let them work. If it is easier, you can divide the learners into small groups and they can each make their own map.*

Practice:
- Give the learners two class sessions to make their maps. Tell them to work

carefully and not rush, since they will have plenty of time.

- You must emphasize neatness and accuracy in their maps. Everything should be the right size and placement on the map. They must label with words the parts of their maps, and they can decorate them as well.

- By the end, you may see maps that look like this, for example, but hopefully with more decoration and interesting features!



- IF they finish their classroom map early, they should then make a map of an area outside the classroom.

MODULE C

Lesson 74: Map-Making – Making a Map of the Classroom

NOTE: This lesson is a continuation of Lesson 73 providing enough time for learners to complete their classroom maps. When everyone is finished, small groups will present their maps to the large group.

Lesson Learning Objectives:

- To complete the classroom map and an outdoor map as well if time allows
- To make presentations to the group and to assess accuracy of a map

Preparation and Materials:

- Chalkboard and chalk

Opener:

- Remind the learners about the maps they began in the last class and emphasize the qualities of careful, accurate and neat work and making their maps beautiful and interesting.

Activities: 45 minutes

Step 1: Finishing the maps

- Give the learners about 30 minutes to finish their maps.

NOTE: As the learners work on their own, take this time to walk around and observe their work. This is a time for you to see how well people understand what you've been teaching.

Step 2: Presentations

- Once all the groups are finished, ask everyone to sit down again. Explain that each group will show their map to the group and explain their drawings.

- Encourage each group to share any difficulties they had with making the map and how they solved their difficulties.

Practice:

- Ask the learners to make a map of their house and bring it in to share.

- Instruct learners to make careful observations of where they live, since next time they will be making a map of their area.

- Refer learners to the workbook for further practice.

MODULE C

Lesson 75: Making a Home Neighborhood Map

Lesson Learning Objectives:

- To be able to make a map of a larger geographical space – a neighborhood
- To develop skills of observation and visual memory

Preparation and Materials:

- Chalkboard and chalk
- Blank pieces of paper, at least one for each learner

Opener:

- Write the following lists on the board. Ask the learners to match the measurements:

1 foot	1760 yards
1 yard	12 inches
1 mile	3 feet

- Review if necessary!

Activities: 45 minutes

Step 1: Review

- Briefly review what a map is and what a map's purpose is.

- Discuss today's work, which will be that each learner will draw a map of his or her home neighborhood. What things will be included in the map? Make a list with the learners of types of things that would be on the map of a neighborhood. (not the whole town or village, but just what they can see from their home)

Some ideas: neighbors' homes, gardens, streets, street signs, shops, trees, etc.

Step 2: The Process

1. First encourage the learners to start by thinking and remembering. What is around their house? What can they see in every direction? They can write down their ideas, or do a rough first drawing.

2. Each learner should start with his or her own house in the middle of the paper. Help the learners remember to keep the sizes in mind – if they make the house too big, they won't have room for all the things around the house.

3. When they are ready, give each learner a large piece of blank paper for their map.

4. Give them the rest of the class to work on their map.

5. Again, make sure they know to do neat and careful work, making it beautiful. They should label everything such as:

   garden tree Kiku's house Bindu's shop small creek
   - whatever they draw on their map should be labeled.

Practice:

- The learners should take their maps home and check to see if their memories and drawings were accurate. They should fix their maps to make them more accurate if needed.

MODULE C

Lesson 76: Reading Maps of the World and Africa

Lesson Learning Objectives:

- To show the cardinal directions of the earth
- To be able to read basic information from a map of Liberia
- To be able to identify Liberia on a map of Africa

Preparation and Materials:

- Chalkboard and chalk
- Maps included on the next pages (Map of the world, Africa) [also in the Appendix]

Opener:

- On the board, write the question: "What are the names of other countries?" Ask them to think of as many as they can. Write down these countries in a list on the board.

Activities: 45 minutes

Step 1: The earth and the 4 directions

- Show the map of the Earth. Discuss the nature of the earth – that it is round, but this is a map showing the earth on a flat piece of paper, so only one side can be seen.

- The dark areas are land; the light areas are water (oceans).

- Explain about the four directions North, South, East and West. The direction to the 'top' of the earth is North. The direction of the 'bottom' of the earth is South. To the 'right' is East, and to the 'left' is West.

- Every map has lines that show which way on the map is North. Find this symbol on the world map.

> **NOTE:** Ask questions to find out how much your learners know about the Earth – about the continents, oceans, etc.

Step 2: Africa on the Earth

- Find Africa on the map. Ask questions to the learners such as:

  - *What land is to the NORTH of Africa?* [Europe]
  - *What land is to the EAST of Africa?* [Asia]
  - *What land is to the WEST of Africa?* [South America] You can also tell the learners that North America is also to the West, but can't be seen on this map.
  - *Is Africa closer to South America, or to Europe?*

- Ask the learners to make other observations about the world earth map. What do they notice, or what other questions do they have?

- You can also identify other places on the map, such as India, Antarctica, etc. and talk about these places.

Step 3: Map of Africa

- Now look at the second map of Africa by itself. First find the North South East West symbol.

- Point out to the learners that all the lines are the country borders and inside are the names of the countries.

- First, find Liberia. It has an arrow pointing to it.

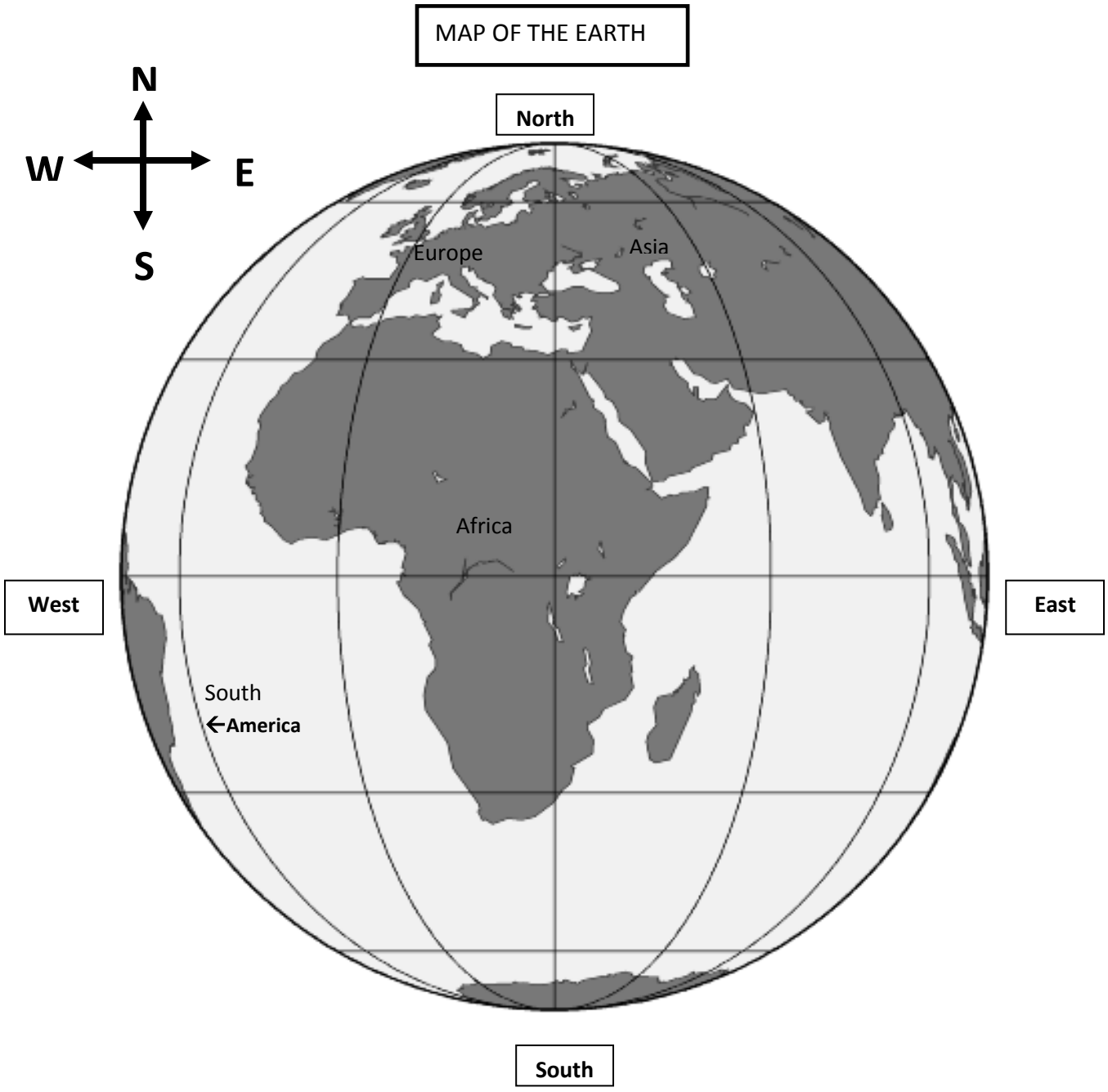
- Is Liberia on the East or West side of Africa? [west]

- Is it more North or South in Africa? [sort of in the middle, but more north]

- Ask the learners to make observations – about the location and size of Liberia and the locations of other countries.

- Ask learners about the sizes of other countries. This is an important aspect of maps – remind the learners of when they made their classroom maps – they had to make sure the door was smaller than the chalkboard, or the map would not be accurate!

NOTE: Post these maps on the wall in your classroom so learners can look at them more later.


MAP OF THE EARTH
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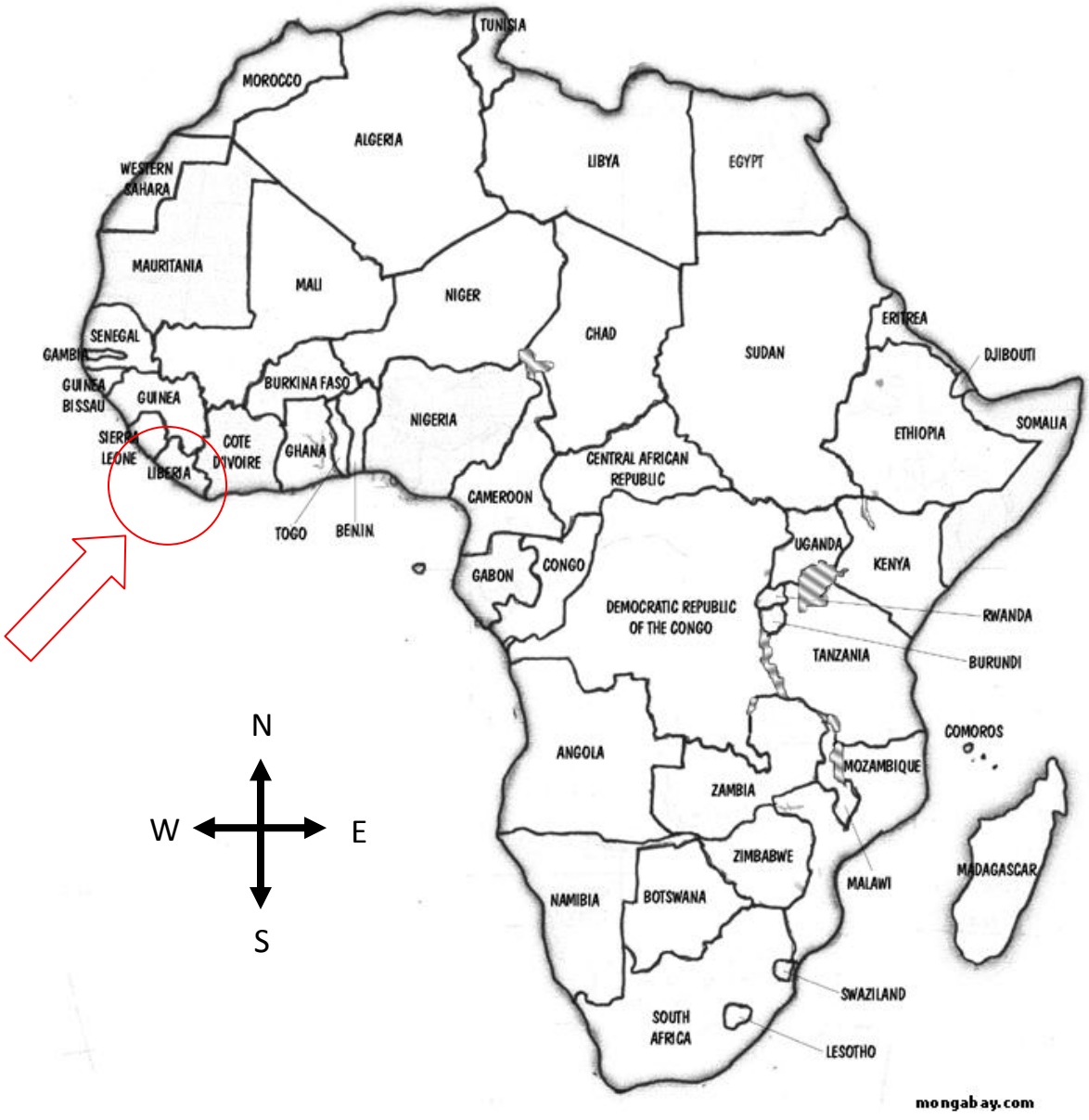
MAP OF AFRICA



MODULE C

Lesson 77: Reading a Map of Liberia and Determining Distance

Lesson Learning Objectives:

- To be able to read a map of Liberia and identify features
- To be able to estimate distances between points on a map using the map scale

Preparation and Materials:

- Chalkboard and chalk
- Pieces of string

Opener:

- Show the map of the world and ask learners to find Africa. Then show a map of Africa and ask them to find Liberia. Review north, south, east and west.

Activities: 45 minutes

Step 1: Map of Liberia

- Looking at this map of Liberia up close, ask the learners what they notice.
- They can see the bordering countries. What country is to the north? What country is to the east? To the west? The Atlantic Ocean is also to the west.
- What are the curvy lines in the map? [answer : rivers going through Liberia]
- Ask the learners to find Monrovia on the map.
- Ask the learners to find the city nearest your class right now and circle it.
- Find the nearest river to your class. What river is it?
- Find any other cities the learners are interested in.

Step 2: Determining Distance on a Map

- Show learners the line on the bottom that says **0--------50 mi**. This means that on this map, **a line that long means 50 miles**.

- Cut a piece of string that long and move it around on the map, showing that any places on the map at the ends of the string are 50 miles away from each other.

- Two pieces of that length of string would mean the places are 50+50 = 100 miles apart.

- Show how to find the distances of other places by holding the string between them on the map and then comparing to the 50 mile scale line on the bottom.

Practice: Let the learners explore the map.

- Ask them questions such as:

  - How far is it from Monrovia to Buchanan? [answer: about 50 miles]
  - How far is it from Monrovia to Gbarnga? [answer: about 100 miles]
  - How far is it from Plibo to Harper, in the south of the country? [answer: about 25 miles]

MAP OF LIBERIA

MODULE C

Lesson 78: Service Activity: Making a Community Map, Part 1

Lesson Learning Objectives:

- To be able to organize efforts to make a community map
- To make the foundation of a community map showing the major roads
- To be able to gather information about community resources in order to make a map

Preparation and Materials:

- Chalkboard and chalk
- Large pieces of paper

Opener:

- What are some of the characteristics of a good map? [answers: accurate size, accurate placement and location, detailed, decorated and beautiful, useful information]

Activities: 45 minutes

Step 1: Introducing this service activity

- **Discuss:** What purpose does a map serve? Who is a map for?

- A map can be for new people or visitors, so they can find their way around. Or a map can give information even to people who are living in a place so that they can learn things about where they live. It can be a way to organize information.

In this activity, you will spend the next few lessons making a detailed map of your community. This map is not just to be able to find people's homes. It is also a way to find out what kinds of resources and strengths are in the community. For example, this class is a community resource, it is a strength. So the location of this classroom should be on the map.

Step 2: What are some other community resources you can think of?

- Discuss with the learners.

- Write their ideas on the board or on large paper.

(Some ideas might be: health clinic, midwife's house, someone who knows how to make musical instruments, someone who is very good at making clothes, someone who knows a lot about plants that are good for different illnesses, shops and markets, the place where people gather to talk or celebrate, churches or mosques, etc .)

- The learners should think of all the good people, places and things in their community and add them to the list.

- Copy this list from the board into the box below for your notes for the next class, or keep the large piece of paper.

Community Resource List Notes

Step 3: The Map

- Tell the class these requirements: The class will produce a large map that shows:

  1. The major roads in the community
  2. Where the learners live in the community
  3. Where the resources of the community are, neatly drawn and labeled.

- The map should be accurate. It should be neatly and carefully made and it should be labeled. And it should be beautiful!

Step 4: Getting Started

- First the class must organize itself. Help the class decide how they will organize. Make sure that *everyone* is involved. Maybe some people will draw the roads, other people will draw houses and other people will draw the resources. Maybe some people will do the writing and other people the drawings.

  It will be helpful to have one or two people lead the group.

- Give the class a big piece of paper and let them begin the work, with this guidance and advice:

  - The foundation of a community is the roads that people travel on. Start with drawing the major roads. The learners may wish to first draw on the

chalkboard to practice and then put it on paper after they're sure.

- Once the roads are drawn and labeled, each learner should draw his or her house on the map on the correct road.

- This is probably as far as the group can get in one class. Don't rush!

Practice:

- The learners should find out more about the resources in their community tonight, asking their family and friends for ideas. They should write these down and come back with them to the next class.

NOTE: Keep the learners' work in a safe place so they can continue on it in the next class.

MODULE C

Lesson 79: Making a Community Map, Part 2

Lesson Learning Objectives:

- To place various community resources on the community map with accurate placement
- To be able to label community resources
- To be able to work in a group on a project

Preparation and Materials:

- Chalkboard and chalk
- Large paper
- Notes from last class

Opener:

- Look at the map started in the last class. Ask the learners what they think about their work. Let them make any corrections or additions to the roads they drew and the locations of their homes. Also write the list of community resources on the board again OR put up the large piece of paper with the list.

Activities: 45 minutes

Step 1: List of community resources

- Ask the learners if they want to add to the list of community resources.

Step 2: Continuing the map

- learners can now continue with the map, putting the location of the various resources on the large paper and carefully labeling them.

> ☼**NOTE:** Again, make sure the learners don't rush. They should take their time and focus on the quality and detail and information of their map.

Practice: Review addition and subtraction.

- Give the learners these problems to take home and solve for homework:

54 **+ 23**	**67** **- 32**	**45** **+ 38**	**64** **- 27**

- Refer learners to the workbook for further practice.

MODULE C

Lesson 80: Finalizing the Community Map and Review

Lesson Learning Objectives:

- To be able to produce the finished community map

Preparation and Materials:

- Chalkboard and chalk
- Prepared review cards, cut out (see in Appendix)

Opener:

- None – all time is for discussion and review

Activities: 45 minutes

Step 1: Finishing the map

- Ask the learners how they feel about their map: Is it complete? Is everything labeled? Is it neat and accurate and beautiful?
- If they need more time to work on it, give them some time.
- If they are finished, have a brief discussion:
  - How do you feel about your work as a group while doing this?
  - What was the most challenging thing about doing this?
  - What does this map show you about your community? What did you learn from doing this?
  - Are you proud of this map?
  - Are you proud of your community?
  - What would you like to do with this map? Is there anyone you'd like to show it to, share it with?

Step 2: Reviewing for evaluation (next class)

- The next class will be the last class for this Module. So the class will be the time for a test/evaluation.

- Review with learners the list of topics they have learned in this Module by reading them this list or writing it on the board.

- Remind learners that the topics they learned in the earlier module such as addition, subtraction, multiplication, division, fractions and large numbers should also always be practiced so they don't forget those things!

TOPICS COVERED IN THIS MODULE

- How to use a calculator for calculations
- Read time on a digital clock
- Know geometrical shapes such as triangle, square, rectangle and circle, and their parts such as side, angle, line and point
- Understand standard units of measurements
- Read a thermometer and know benchmarks such as body temperature
- Read intervals on a scale such as a thermometer
- Know the units of length, their sizes and when to use each one: inches, feet, yards, miles
- Measure objects in inches, feet or yards
- Know the units of volume, their sizes and when to use each one: ounces, cups, pints, quarts, gallons
- Know how to make Oral Rehydration Solution using measurement skills
- Understand that a map represents the relative position of places and objects
- Draw a simple map of the classroom

Step 3: Reviewing

- The learners can work in small groups. Give each group some of the review cards to work on.

- They should read the questions and answer them in their notebooks and not write on the cards themselves.

- They can then exchange and share different cards with each other to practice.

- If the learners find they have questions or can't answer the questions, you should review with them.

Practice:

- The learners should go back through their notebooks and redo the earlier questions from the earlier lessons. You should also be ready to make up questions for them to solve such as addition, subtraction, multiplication, division and fractions.

MODULE C

Lesson 81: Evaluation

Lesson Learning Objectives:

- To be able to assess learners' mastery of the topics in Module C, as well as earlier fundamental skills

Preparation and Materials:

- Chalkboard and chalk
- Ruler
- Prepared evaluation cards (see Appendix)

Opener:

- None – all time is for evaluation

Activities: 45 minutes

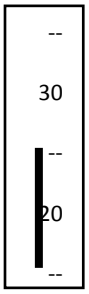
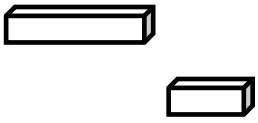
Step 1:
- Review with the learners how evaluation is done – that they must work alone and do their best.

Step 2:
- Write the evaluation questions on the board. learners should answer the questions on their paper and then give them to you to check.

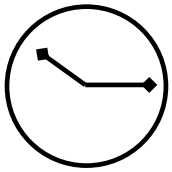
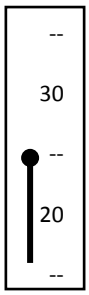
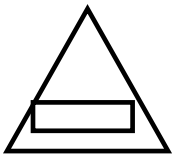
Step 3:
- If you have time and everyone finishes, you should go through the evaluation questions with the class right then, answering and explaining the answers, so that the learners can immediately see what they did correctly as well as where they need to keep practicing.

NOTE: As always with evaluation and assessment, you as the Facilitator need to carefully note any learners who need extra help, who are having trouble learning the concepts. Then try to find a way to help them further.

Module C
Evaluation Questions

1. Draw a line 8 inches long.	2. Use < or > between: ounce pound mile yard quart pint cup gallon foot inch	3. Draw an analog clock showing: 10:15	4. What temperature is showing? 
5. One box is 14 feet long. Another box is 8 feet long. How much longer is the first box? 	6. Binda has 12 pounds of potatoes. Her friend Kaki has 15 pounds of potatoes. How much do they have together?	7. Draw a rectangle inside a triangle. How many lines did you draw?	8. Fill in the blanks: 1 foot = _____ inches 1 gallon = _____ quarts 1 pound = _____ ounces 1 yard = _____ feet

Evaluation Answers

1. Draw a line 8 inches long.	2. Use < or > between: ounce **<** pound mile **>** yard quart **>** pint cup **<** gallon foot **>** inch	3. Draw an analog clock showing: 10:15 	4. What temperature is showing? **25°** 
5. One box is 14 feet long. Another box is 8 feet long. How much longer is the first box?  14 – 8 = 6 feet	6. Binda has 12 pounds of potatoes. Her friend Kaki has 15 pounds of potatoes. How much do they have together? 12 + 15 = 27 pounds	7. Draw a rectangle inside a triangle. How many lines did you draw? 3 + 4 = 7 lines 	8. Fill in the blanks: 1 foot = __**12**__ inches 1 gallon = __**4**_ quarts 1 pound = _**16**__ ounces 1 yard = _**3**__ feet

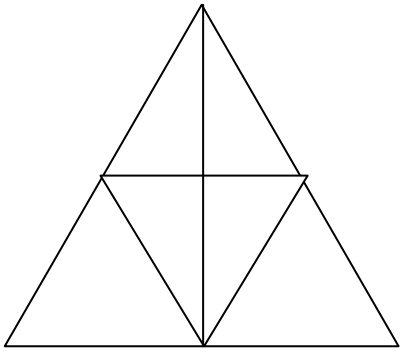
Appendix of Diagrams for Use in Module C

These are materials to be used in lessons as noted. Diagrams may be copied, or they can be cut out from these pages for use in class.

Lesson 59: Finding and Tallying Shapes

Cut along the lines and give one set of A, B and C to each group of learners.

A



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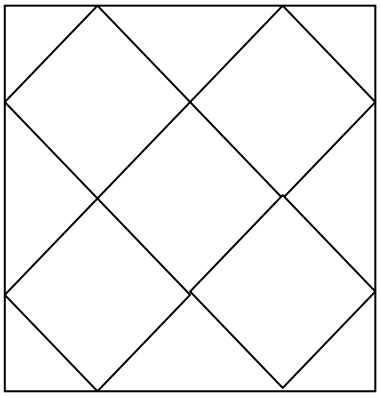

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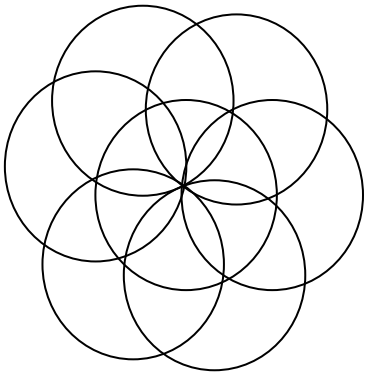

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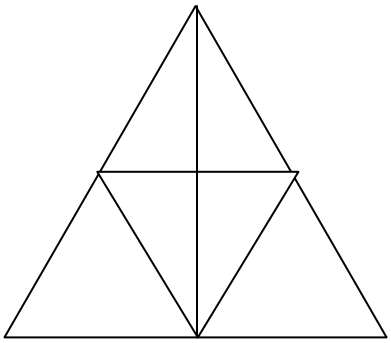

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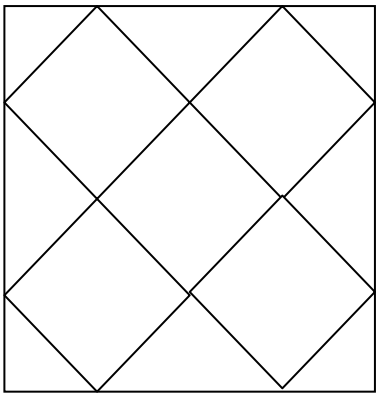

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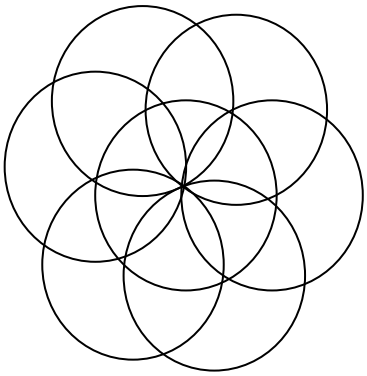

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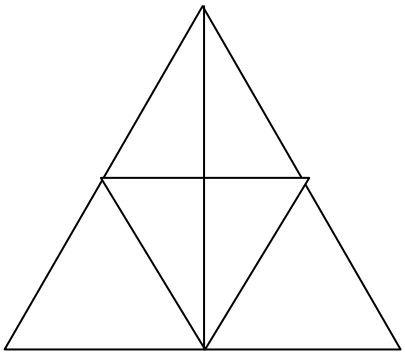

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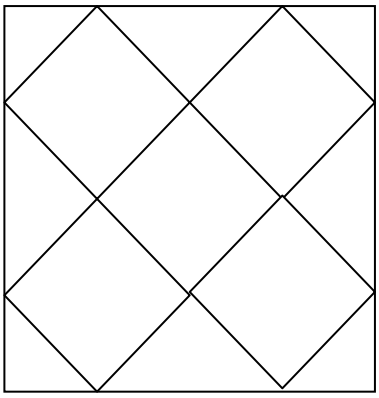

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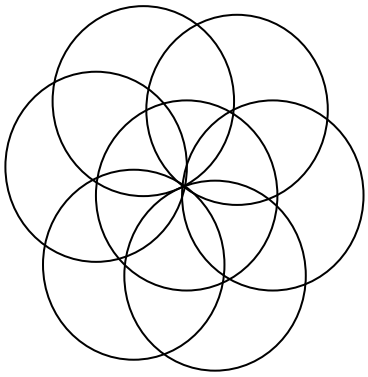
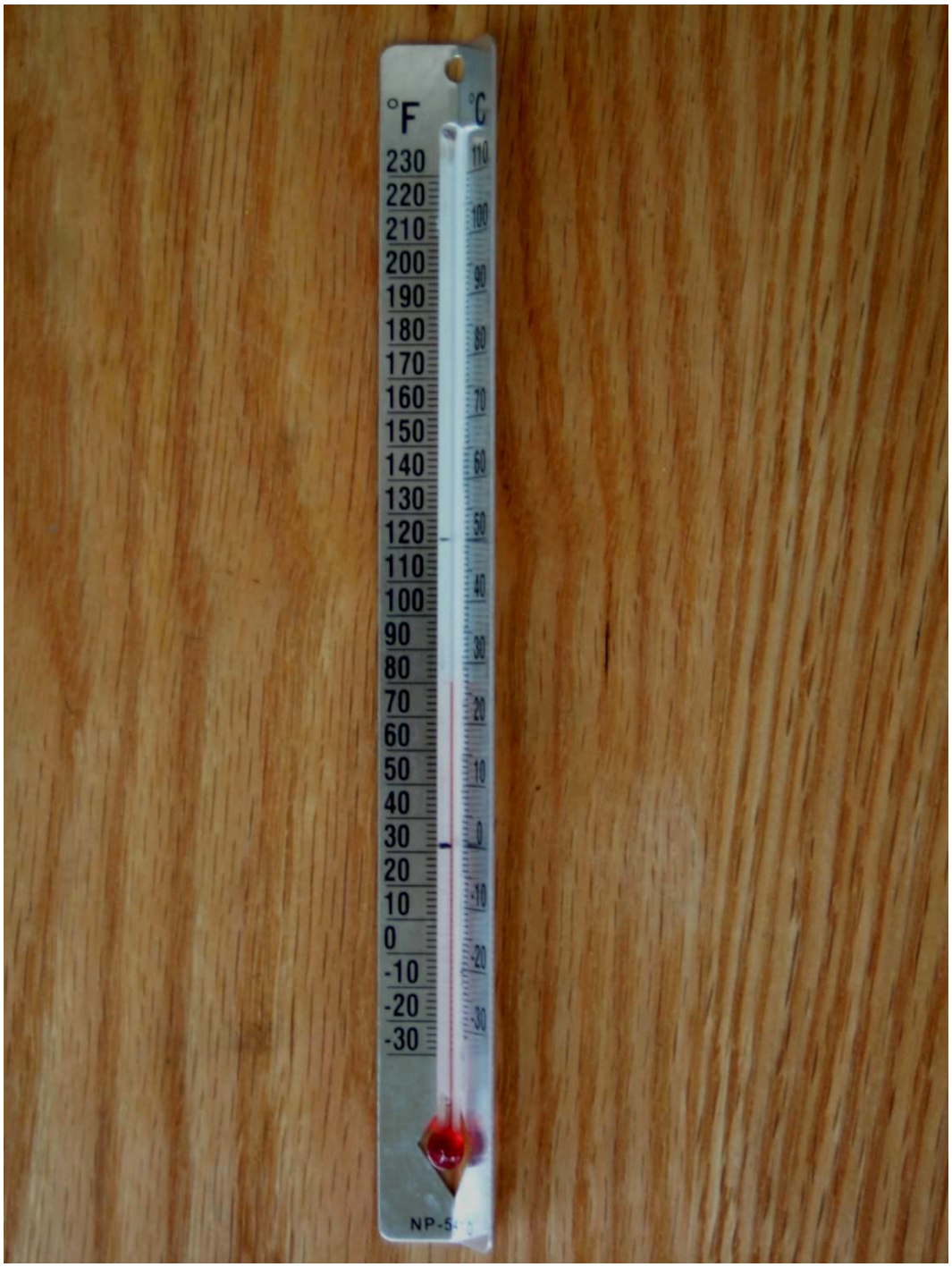


Lesson 61: Measurement of Time – Units of Time

Lesson 64 – Measuring Temperature

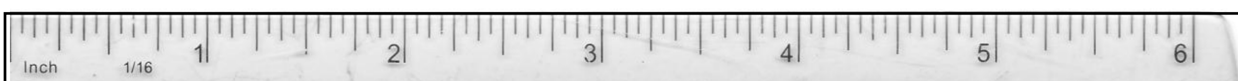
Picture of a thermometer showing a temperature of 80 °F



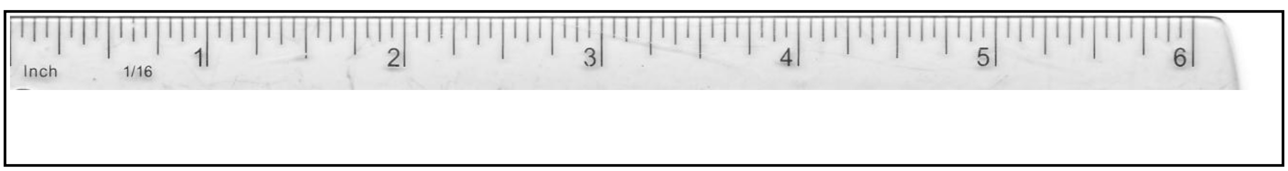
Lesson 65 – Measurement of Length – Standard and Non-Standard Units

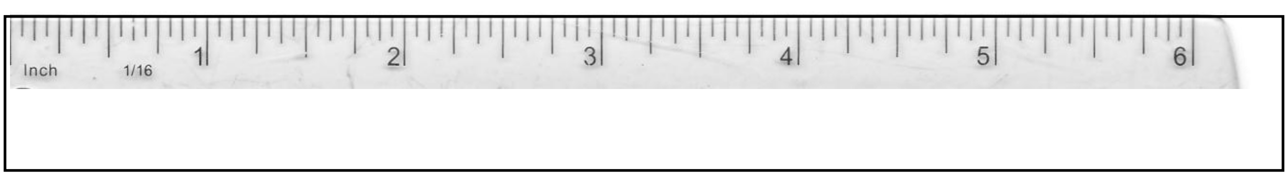
Rulers

Lesson 65 – Rulers

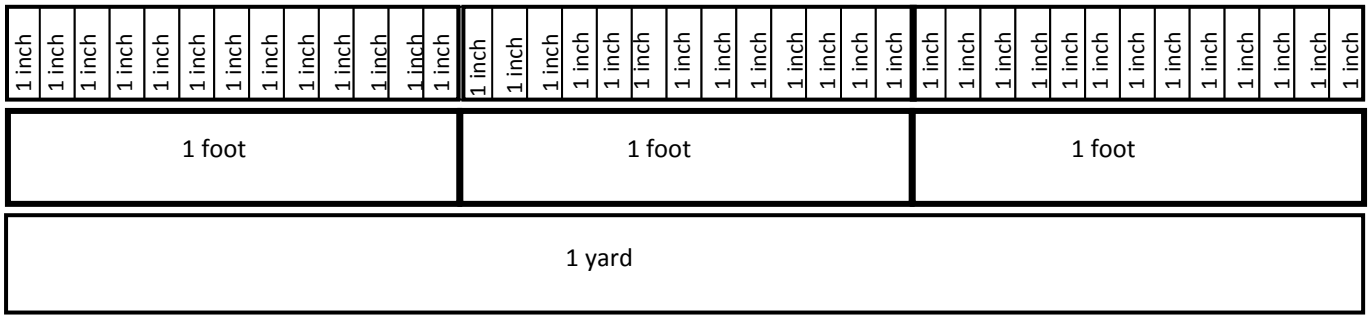


Lesson 65 – Rulers





Lesson 67: Using Yards and Feet

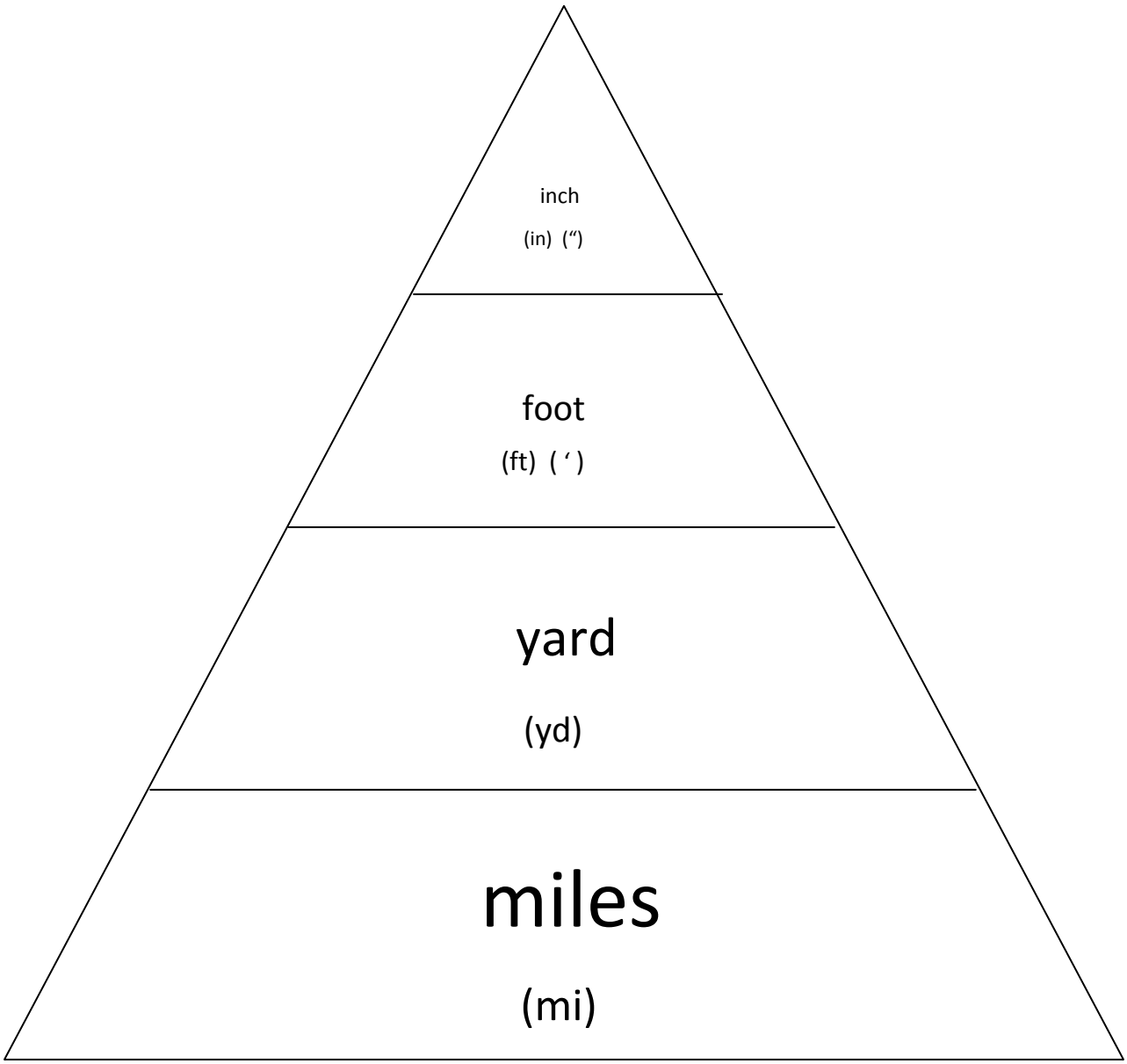


Lesson 68 – Miles and Practice with Measurement and Estimation

(Measurement cards to be cut out)

From Monrovia to Gbarnga	**50 miles**	**Height of a man**	**6 feet**
Height of a door	**7 feet**	**Length of a potato**	**4 inches**
Height of a 3 year old child	**1 yd**	**Length of a fish**	**8 inches**
Length of a book	**10 inches**	**Size of a TV**	**2 feet**
Length of a football field	**100 yards**	**From Harper to Kakata**	**200 miles**
Height of a tree	**5 yards**	**The distance to cross a river**	**20 yards**
Length of a table	**5 feet**	**The size of a paper clip**	**1 inch**
Length of $1 bill	**6 inches**	**The backseat of a taxi**	**4 feet**

Length Measurement Triangle



Lesson 71 – Measuring Volume (Capacity) – Gallons, Quarts and Pints

(Cut out and give to learners, asking them to read out loud and discuss each one)

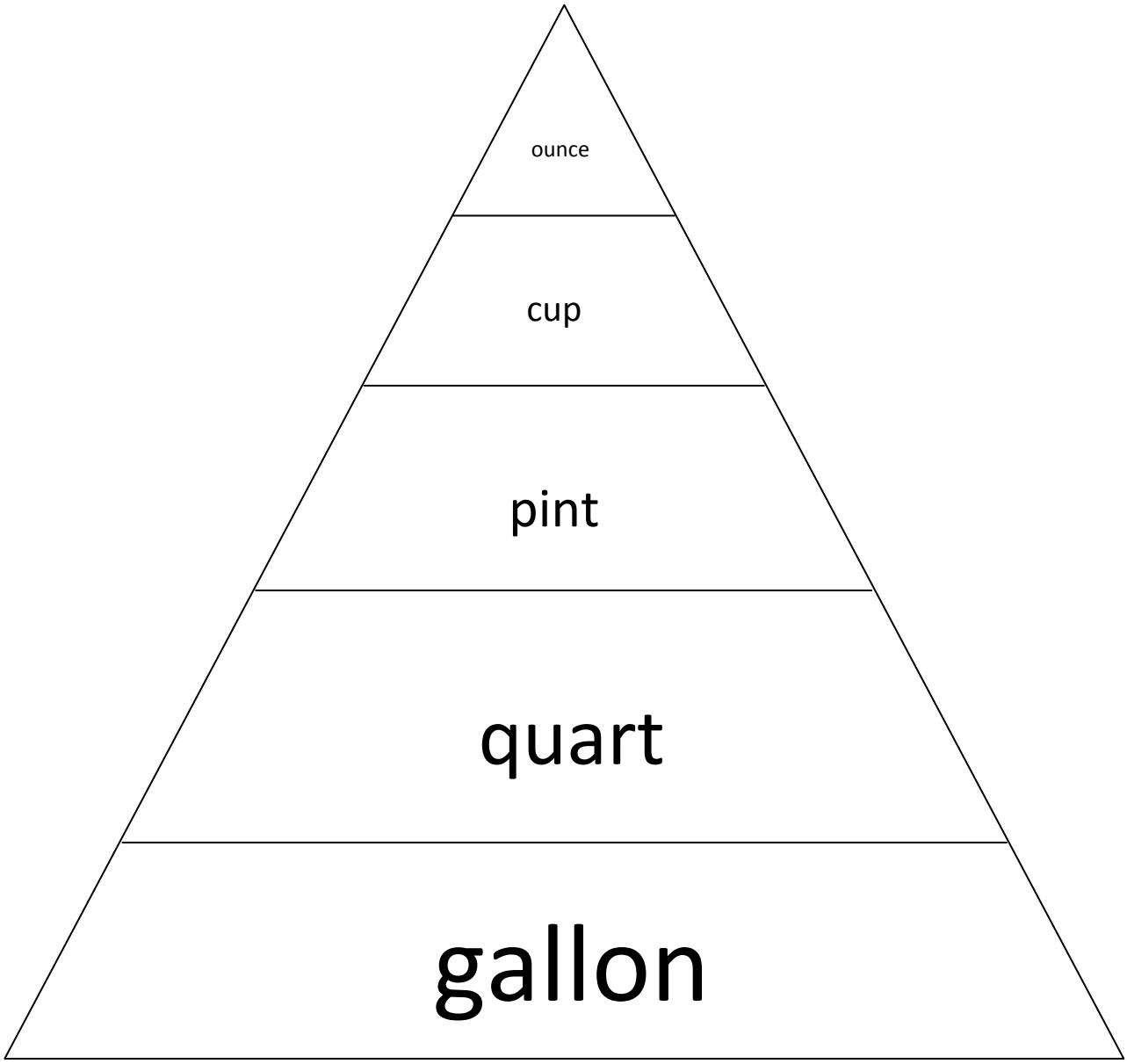
☼**FACT 1:** A healthy adult body has almost **6 quarts** of blood.

☼**FACT:** If we don't drink enough water, we can get headaches, be in a bad mood, and feel weak. Adults should try to drink **one glass of water every hour**. This is almost **1 gallon** of water every day! It is very good for our health. (Children also need to drink a lot of water every day.)

☼**FACT:** Our body needs water to live. If we do not have enough water, the body will die. This is why children who have diarrhea MUST be given extra water to drink, because they are losing too much water from their body from the diarrhea. Anyone who has diarrhea **must** drink even MORE water.

☼**FACT:** Our body loses water through breathing. We lose almost **one quart** of water from our body every day just through breathing. If you hold your hand close to your mouth and breathe on it, you can feel the water in your breath.

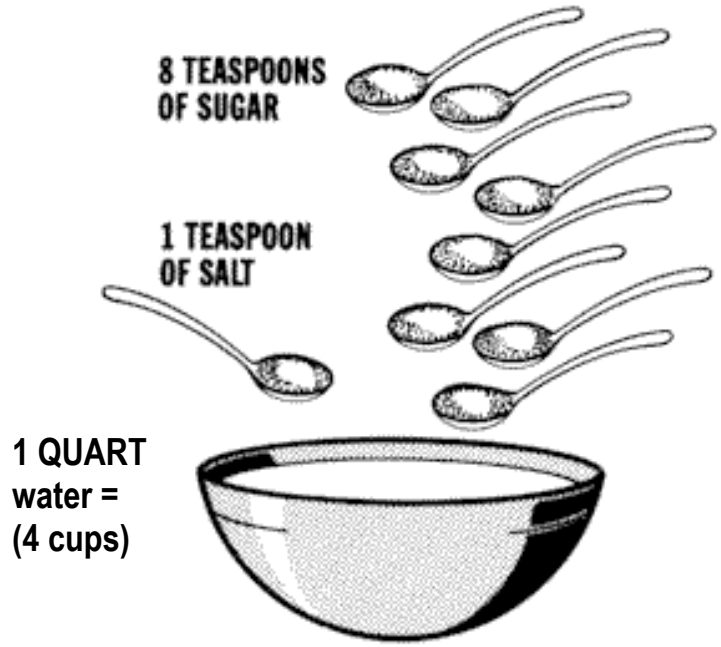
Volume (Liquid) Measurement Triangle



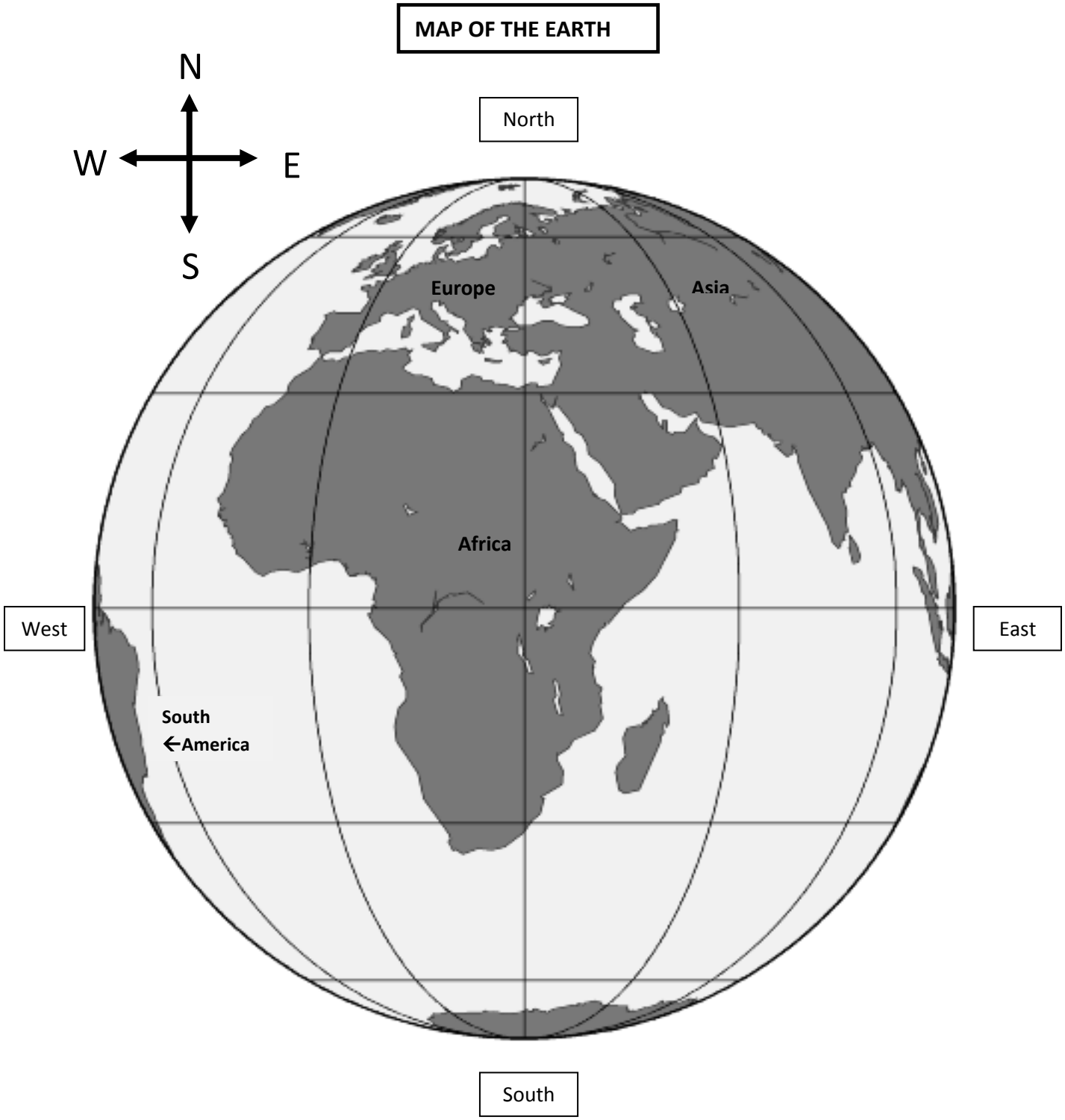
Lesson 72 – Using Volume Units to make Oral Rehydration Solution

How to make ORS for someone with diarrhea

1. You will need: a cup measure, a quart measure, a jug or large bowl, a teaspoon, sugar, salt and water
2. Wash your hands and wash the jug and cup and spoon.
3. Boil the water if it is not clean. Let it cool.
4. Pour **one quart of water** into the jug.
5. Add 2 ounces of sugar (8 teaspoons)
6. Add 1 teaspoon of salt
7. Stir, and then give to the sick person. Give them a cup after each time they have to go to the toilet. Let them drink it slowly, but they should drink a lot of it, until they are better.



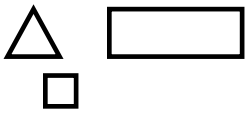
Lesson 76: Reading Maps of the World and Africa

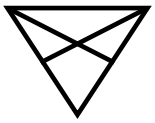


Lesson 76: Reading Maps of the World and Africa

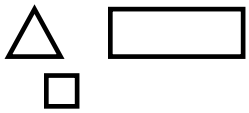
Lesson 76: Reading Maps of the World and Africa

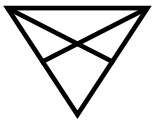
Lesson 80 – Review Cards to cut out and for learners to answer and exchange

1. How many inches are in one foot?	2. Measure the length of your thumb in inches.	3. Read the number 463 and break it down into hundreds, tens and ones.	4. Write down the shape names, and how many angles they have. 
5. What is 5 x 7 ?	6. How many quarts are in a gallon?	7. 64 + 28 =	8. Use **<** or **>** between: quart ounce yard foot pint cup
9. Draw a small map of your kitchen at home.	10. Which is more, ½ or 1/8?	11. Which is less time, 10 seconds or 1 minute?	12. What is 64 ÷ 8?
13. If you leave for class at 8:00 and you arrive at 8:30, how many minutes did it take you to get there?	14. Use a ruler to draw a line 7 inches long.	15. What unit would you use to measure a carpet? -inches -miles -yards -ounces	16. Finish the pattern: 5, 10, ___, ___, 25

17. Draw a thermometer that shows 50 degrees.	18. 8 9 - 4 6	19. 7 3 - 4 6	20. How many triangles are there? 
21. One tree is 12 feet tall. Another tree is 9 feet tall. How much taller is the first tree?	22. Saah has 3 quarts of petrol. His brother has 3 quarts also. Together, do they have **more** or **less** than one gallon of petrol?	23. Bonus: Challenge question! If your garden is 10 feet long and 4 feet wide, how many feet of wire do you need to make a fence all the way around?	24. Bonus: challenge question! How many yards are in 12 feet?

Answers to Review Cards

1. How many inches are in one foot? **12 inches = 1 foot**	2. Measure the length of your thumb in inches.	3. Read the number 463 and break it down into hundreds, tens and ones. **4 hundreds** **6 tens** **3 ones 400+60+3**	4. Write down the shape names, and how many angles they have. 
5. What is 5 x 7? **35**	6. How many quarts are in a gallon? **4**	7. 64 + 28 = **92**	8. Use **<** or **>** between: quart **>** ounce yard **>** foot pint **>** cup
9. Draw a small map of your kitchen at home.	10. Which is more, ½ or 1/8? **1/2**	11. Which is less time, 10 seconds or 1 minute? **10 seconds**	12. What is 64 ÷ 8 ? **8**
13. If you leave for class at 8:00 and you arrive at 8:30, how many minutes did it take you to get there? **30 minutes**	14. Use a ruler to draw a line 7 inches long.	15. What unit would you use to measure a carpet? -inches -miles **-yards** -ounces	16. Finish the pattern: 5, 10, **_15_**, **_20_**, 25

17. Draw a thermometer showing 50 degrees.	18. 8 9 - 4 6 **4 3**	19. 7 3 - 4 6 **2 7**	20. How many triangles are there? **11** 
21. One tree is 12 feet tall. Another tree is 9 feet tall. How much taller is the first tree? **3 feet**	22. Saah has 3 quarts of petrol. His brother has 3 quarts also. Together, do they have **more** or **less** than one gallon of petrol? **More (1 ½ gal)**	23. Bonus: Challenge question! If your garden is 10 feet long and 4 feet wide, how many feet of wire do you need to make a fence all the way around? **28 ft**	24. Bonus: challenge question! How many yards are in 12 feet? **4 yards**

Module D Overview

Module D: "The News and Numbers"
(Data, Statistics and Representation)

By the end of the module, learners will be prepared to:

- Add lists of numbers
- Multiply a 2 digit number by a 1 digit number
- Add and subtract numbers up to the thousands
- Measure in fractions of feet and inches
- Organize a survey and use data tables and bar graphs to present the information
- Interpret meaning from information presented in percentages
- Apply data gathering and representation to nutrition

Overview

Learning Objectives: The learner who successfully completes this 26 lesson module should be able to:

- Add and subtract in numbers up to the 1000's
- Multiply 2 digit by 1 digit numbers
- Organize and conduct a survey
- Organize information in a data table
- Make a bar graph from data in a table
- Interpret meaning from a bar graph
- Understand commonly used percent fractions
- Interpret meaning from percentage information presented in circle graphs
- Apply measurement and calculation skills to real situations
- Identify major types of nutritional foods

Links with other modules: This Module will build on earlier work of the fundamentals developed in Modules A and B and offer more advanced work with calculations. In addition, geometry and measurement skills from Module C will be used in the process of gathering and representing information in activities in this Module.

Estimated length of module: 27 lessons = 3 lessons per week = 9 weeks

LESSON	MODULE D LESSON TITLES [* indicates materials for that lesson are also in the Appendix]
82	Addition and Subtraction Practice – 3-Digit Numbers
83	Introducing the Thousands, and Adding/Subtracting
84	Adding Lists of Numbers
85*	Subtraction and Practice
86*	More Addition and Subtraction Practice – Perimeter, and Shopping Lists
87*	Multiplication Practice and 2 Digit x 1 Digit Multiplication with No Carryover
88*	Practicing Long Multiplication with No Carrying Over Yet (Story Problems)
89	Long Multiplication with Carry-Over
90*	Games to Practice Long Multiplication
91	Fraction Review
92	Measuring Feet and Inches with Fractions
93	Using Fractions – A Classroom Shelving Project
94*	Introduction to Percents
95*	Showing Information with Percents
96*	**Project 1 Class Surveys, Part 1:** Class Surveys and Making Bar Graphs
97	**Project 1 Class Surveys, Part 2:** More Class Surveys
98	**Project 1 Class Surveys, Conclusion**: Conclusion of Class Surveys
99	**Project 2, Community Survey: Part 1** : Deciding on the Questions
100	**Project 2, Community Survey, Part 2:** Data Tallying with the Group
101	**Project 2, Community Survey : Conclusion**, Bar Graphs and Results
102*	**Project 3 Family Finance, part 1**: Set up recordkeeping, review addition
103*	**Project 4, Nutrition, Part 1:** Introduction to Nutrition

104*	**Project 4 Nutrition, Part 2:** Planning a Garden
105	**Project 4 Nutrition, Conclusion**: Finishing the Gardens
106	**Returning to Project 3, Project 3, Family Finance: Conclusion** – "Where does the money go?"
107	LEVEL 1 REVIEW
108	LEVEL 1 EVALUATION
	*** APPENDIX** – DIAGRAMS AND MATERIALS TO BE CUT OUT FOR LESSONS

Materials needed for Module D:

- Tape measures
- Yardsticks
- Map of Liberia
- Scissors
- Large pieces of paper for posters and maps
- Rulers
- Calculator(s)
- Blank paper to prepare cards and posters

MODULE D

Lesson 82: Addition and Subtraction Practice: 3-Digit Numbers

Lesson Learning Objectives:

- To review and practice addition and subtraction of larger numbers

Preparation and Materials:

- Chalkboard and chalk

Opener:

- Review addition facts – learners should answer as quickly as possible:

4+5= 6+2= 3+9= 6+4= 8+6= 3+7= 7+5= 5+7= 3+8= 8+5= 2+3= 7+1=

Activities: 45 minutes

Step 1: Review

- On the board, review how to write and solve addition problems such as 37 + 48.
- Review how to read and write larger numbers in the hundreds such as 468, 196, etc.

Step 2: Adding Larger Numbers

- On the board, show how to add larger numbers that don't need carrying over, keeping numbers lined up→

- Then show an example that needs carrying over, but **NOT into the thousands yet!!**

2 4 7 **+ 1 7 5**	**3 5 4** **+ 2 3 1**

- Do other examples, showing the learners and then writing on the board and asking them to solve the problem.

Examples: **386 +258 =** **167 + 228 =** **405 + 289 =**

NOTE: Make sure to leave time at the end of class to go over the answers so the learners can check their work. **You must solve the problems first yourself!**

Practice:

- Write the following problems on the board. learners should copy them and solve them, writing them lined up:

359 + 347	452 + 528	729 + 157	567 + 357	273 + 348	462 + 197

- Refer learners to the workbook for further practice

MODULE D

Lesson 83: Introducing the Thousands and Adding/Subtracting

Lesson Learning Objectives:

- To be able to read, write and add numbers in the thousands

Preparation and Materials:

- Chalkboard and chalk

Activities: 45 minutes

Step 1: Review place value columns

- Look at the number **754**: identify how many ones (4), how many tens (5), how many hundreds (7). Show that **754 = 700 + 50 + 4**
- Review the columns: hundreds | tens | ones

Step 2: The Thousands

- Show that the next column is the **thousands** column:

  thousands | hundreds | tens | ones

- So the number 999 is the largest number in the hundreds, then it goes to 1000. The thousands are : **1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000**

  One thousand = ten hundreds

Step 3: Reading thousands

- The number **3245** means 3 thousands, 2 hundreds, 4 tens, and 5 ones.
- Write several numbers in the thousands on the board and learners should break them down in this way:

3000
200
40
5
3245

Step 4: Adding in the thousands

- Show the learners how to add:

4231
+ 3564

- Give them other problems to solve like this. They should also read each number out loud.

Examples: **1354 + 2642 =** **6462 + 2416 =** **5354 + 2634 =**

Step 5: Carrying over into the thousands

- Show how to add 467 + 864 = . Make sure to keep the numbers lined up for the carry-over into the thousands: (answer = 1331)
- learners should read the final answer out loud.
- Do more examples for the learners such as:

648 + 739 = 557 + 942 = 483 + 730 =

Practice:

- For homework, the learners should do the following problems:

847 + 576	396 + 648	5372 + 1845	2658 + 2745

758 + 525	2475 + 782	824 + 719	4056 + 2403

- Refer learners to the workbook for further practice

MODULE D

Lesson 84: Adding Lists of Numbers

Lesson Learning Objectives:

- To be able to add lists of numbers

Preparation and Materials:

- Chalkboard and chalk
- Calculator

Opener:

- Write on the board: 1435 2786
- Ask learners to read the numbers, add them and then read the answer.

Activities: 45 minutes

Step 1: Adding small lists of numbers

- Write on the board: 4 + 2 + 3 =
- Show how to solve this: 4 + 2 = **6**, then **6** + 3 = 9
- Another example: 3 + 5 + 4 = ? (answer = 12)
- Give other simple examples: 2 + 3 + 4 = 6 + 3 + 2 = 1 + 7 + 5 =
- It can be done with more than 3 numbers as well : 3 + 2 + 4 + 1 =

Step 2: Lists of larger numbers

- When do we have lists of numbers? Such as when we're shopping and we have to add the prices.
- Write on the board a list of 2-digit numbers.

- Show how to solve this, adding the ones column first: 4 + 3 + 1 = 8

24
13
+ 21

- Then the tens column: 2 + 1 + 2 = 5. So the answer is 58.

24
13
+ 21
58

- Do an example that shows carrying:
- First, add the ones. 6 + 5 + 4 = 11 + 4 = 15 so write the 5 and carry the 1 to the tens column.
- Then add the tens column: 1 (carried) + 5 + 2 + 1 = 6 + 2 + 1 = 8 + 1 = 9
- So the answer is 95.

56
25
+ 14

Step 3:

- Do several examples, adding 3 numbers:

45 + 46 + 28 =
(answer = 119)

NOTE: If the answer carries over into the hundreds, make sure you show that step as well.

73 + 84 + 26 =
(answer = 183)

NOTE: You must do MANY examples with the learners, at least **4**. Make up more problems on your own!

Practice:

- learners should do the following problems on their own and for homework if they don't finish them in class:

76 45 + 24	64 36 + 83	142 256 + 201	43 17 35 + 22	436 205 + 736	37 15 + 8

NOTE: If you have a calculator, you can tell the learners that they can check their answers using the calculator when they're finished.

Make sure that you show them to push the **+** button between **each** number on the list when using the calculator.

MODULE D

Lesson 85: Subtraction and Practice

Lesson Learning Objectives:

- To be able to subtract numbers in the hundreds and thousands
- To gain more skill at adding and subtracting

Preparation and Materials:

- Chalkboard and chalk
- Number cards, cut out (see Appendix for large version→)
- Calculator

75	**185**	**62**	**40**	**815**
47	**18**	**320**	**98**	**7**
68	**367**	**222**	**800**	**458**
576	**55**	**471**	**11**	**99**
86	**23**	**851**	**53**	**36**
406	**943**	**72**	**49**	**15**

Opener:

- Review subtraction. Write on the board for learners to answer:

6 – 2 = **10 – 3 =** **8 – 4 =** **11 – 2 =** **15 – 8 =** **12 – 4 =**

Activities: 45 minutes

Step 1: Reviewing subtraction without borrowing

- Review with the learners the *process and language and meaning* of subtraction, doing the problem 76 – 24= (answer = 52)

$$\begin{array}{r} 76 \\ -\ 24 \\ \hline \end{array}$$

- If they need to see another problem like this (without borrowing) do another one, such as 97 – 34 = (answer = 63)

Step 2: Reviewing subtraction with borrowing

- Review subtraction with borrowing, using the sample problem 54 – 28 = (answer = 26)

54
- 28

- Do another sample problem and the learners should also solve it: 75 – 39 = (answer = 36)

Step 3: Subtraction with larger numbers

- When working with larger numbers, the process of subtraction is the same, it just happens in more columns.
- Show the learners how to solve problems in the hundreds, first without borrowing: 785 – 261= (answer = 524)
- Then with borrowing: 624 – 387 = (answer = 237)

Practice:

- Pass out the pre-cut number cards on the learners' tables. They should pick cards and make up their own problems by adding or subtracting any of the cards. They should copy their problems into their notebooks, lining up the numbers properly and then solve them carefully.

  Required: 4 addition problems and 4 subtraction problems.

- They can check their answers with the calculator after they've finished.
- If they do not finish all 8 problems, they should do them for homework.

MODULE D

Lesson 86: More Addition and Subtraction Practice – Perimeter and Shopping Lists

Lesson Learning Objectives:

- To apply skills of addition and subtraction to measurement and geometry, as well as money

Preparation and Materials:

- Chalkboard and chalk
- Pre-cut 'price' cards (see Appendix)
- Ruler or tape measure
- Small items to 'sell' (small things)

Opener:

- Complete the pattern: 20, 18, 16, ___, ___, 10, ___

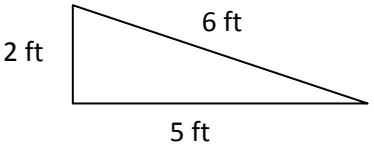
Activities: 45 minutes

Step 1: Introduction and perimeter

- Review shapes triangle, rectangle, square.

- Example situation: if we have a rectangle shaped garden and we need to put a fence around it, we must know how far around it is. The distance AROUND a shape is called the **PERIMETER.**

For example: The perimeter of this triangle is 13 ft, because all the way around is 2 + 6 + 5 = 8 +5 = 13 ft.



- To find the perimeter, you must ADD the length of all the sides.

Step 2: Two activities

> **NOTE:** This lesson has two activities, A and B. You may choose to divide the class in half and set up activity stations so both activities are at the same time and the learners take turns at both stations. You should check on them as they are working.

Activity A: Shopping

- Set out the price cards, or the items with prices.
- learners should make a 'shopping list' of things they want to buy , writing them down and adding up the prices to see how much money they would need.
- Tell the learners to pretend they have 50 dollars (or 200 dollars, or whatever you want) and they have to make sure they have enough money for what they want to buy. Then they must subtract to figure out how much change they will get back.
- They should make at least 2 different shopping lists.

Activity B: Measuring perimeter

- Give the learners rulers or tape measures. They should choose 3 objects in the room to measure the perimeter.
- They must write down the object they chose, draw and label the lengths of the sides and add them to find the perimeter.

Practice:

- learners should repeat one of the activities at home, either making a shopping list with prices, or measuring the perimeter of something in their home.

MODULE D

Lesson 87: Multiplication Practice and 2 Digit x 1 Digit Multiplication With No Carryover

Lesson Learning Objectives:

- To review the operation of multiplication and the facts up through 10x10
- To be able to multiply 2 digits by 1 digit without carrying over

Preparation and Materials:

- Chalkboard and chalk
- Multiplication chart (10x10 chart from Module B) hung on the wall
- Multiplication flashcards (see Appendix)

Opener:

- Write on the board for the learners to solve:
  4 x 6 = 7 x 8 = 3 x 5 = 2 x 2 =

Activities: 45 minutes

Step 1: Brief review of multiplication facts

- Review first the meaning and symbols of multiplication, using the Opener activity for examples.

- The learners will work in pairs. Give each pair some of the flashcards. They should quiz each other, trying to answer as quickly as possible and checking their answers on the chart if they're not sure.

Step 2: Long multiplication introduction

- Up to now, learners have only multiplied single-digit numbers. Now you will show them how to multiply larger numbers. The way to do this is to break down

the larger number:

1. Write on the board:

1x10=
2x10=
3x10=
4x10=
5x10=
6x10=
7x10=
8x10=
9x10=
10x10=

- The learners should give the answers. Write them down.

- Then ask the learners what the pattern is , when multiplying by 10.
  [When multiplying by 10, a 0 is added to the number.]

2. Now write 20 x 3 = on the board. Show that the answer is found by first 2x3 = 6, but since 20 is 2 x 10, we must do 6 x 10 and the answer is 60. 20 x 3 = 60

- Show other examples: 20 x 4 = 80
  (underline the 0's to show the pattern better: 20 x 4 = 80)
  20 x 2 = 40 **30 x 3 = 90** **40 x 2 = 80**

- Show that even when the numbers are larger, the same pattern works, adding a 0:
  40 x 4 = 160 [4 x 4 = 16, then add a 0 → 160]

- Show other examples:
  50 x 3 = 150 **70 x 4 = 280** **60 x 4 = 240**

- Give the learners several examples to do themselves:
  30 x 4 = **20 x 7 =** **50 x 7 =** **40 x 3 =** **60 x 3 =**

3. Now you are ready to show how to solve problems like 32 x 2 =

Write the numbers carefully lined up, with the large number on top and the smaller number lined up with the ones in the large	**32** **x 2**

number.	
This problem is the same as two problems: **30** and **2** **x 2** **x 2**	**32** **x 2**
Do the ones first: **2** **x 2** and write it under the ones: **4**	**32** **x 2** **4**
Then the **3 x 2** (since it is actually 30 x 2, it is 60, so the 6 goes in the tens place)	**32** **x 2** **64**
To summarize: 32 x 2 is the same as: **30** **2** **x 2** and **x 2** **60** **4** and 60 + 4 = **64**	**32** **x 2** **64**

4. Do two more examples with the learners, but make sure the problems do NOT require carrying over yet:

Examples**:**

43 **x 2**	**23** **x 3**

5. Give two problems to the learners to solve themselves. Check their work.

41 **x 2**	**22** **x 3**

Practice:

- learners should practice more problems, doing them at home if they don't finish in class:

21 **x 2**	**31** **x 2**	**21** **x 3**	**24** **x 2**	**32** **x 3**	**33** **x 3**

- Refer learners to the workbook for further practice

MODULE D

Lesson 88: Practicing Long Multiplication With No Carrying Over Yet

Lesson Learning Objectives:

- To apply multiplication skills to story problems

Preparation and Materials:

- Chalkboard and chalk
- Prepare story problems, cut out (see Appendix)

Opener:

- Ask learners to solve:
  40 x 3 = 42 x 2 =

Activities: 45 minutes

Step 1: Review

- Use the Opener questions and the homework from Lesson 87 to review.

Step 2: Story Problems

- Write this story problem on the board and solve it with the learners as an example:

Fiah sells 13 bottles of drinks from his shop every day for 3 days. How many bottles did he sell altogether?

How to solve:

1. Read the problem carefully and make sure the situation is understood.
2. Draw a picture to represent it, if that is helpful:

Day 1	Day 2	Day 3
13	13	13

3. Write it as a math problem: 13 x 3 = ?
4. Solve:

```
  13
x  3
  39
```

5. **Answer = 39 bottles**

- Pass out the story problem papers to the learners. They should share the papers, solving a problem and then giving the paper to someone else.

- They should solve at least 3 problems each. Help them when they need it.

Step 3: Presentations

- After everyone has solved 3 problems, ask learners to come up to the board to explain and show how they solved the problems.

Practice:

- learners should make up their own story problem using numbers from this set only:

  22 , 32, 30, 33, 13, 23 and 2 or 3.

[They must use these numbers, or else their multiplication will require carrying over, which they have not yet learned.]

- Refer learners to the workbook for further practice

MODULE D

Lesson 89: Long Multiplication With Carry-Over

Lesson Learning Objectives:

- To be able to solve 2-digit x 1-digit multiplication problems with carry-over

Preparation and Materials:

- Chalkboard and chalk

Opener:

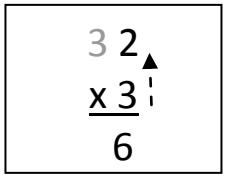
- Write on the board for learners to solve:

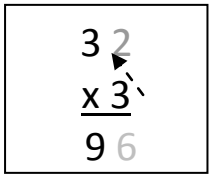
5 x 7 = **6 + 8 =** **24 + 3 =**

Activities: 45 minutes

Step 1: Review without carryover

- First, do one problem without carry-over, such as 32 x 3. Review how to line up the numbers and which numbers to multiply first:





NOTE: It is very important that the learners understand how to do these problems before going on. If you need to, do more reviews.

Step 2: Demonstrate with carry-over

- Now you will show how to solve a problem that has larger numbers and requires carry-over into the tens:
  Example: 43 x 6 =

Write the numbers carefully lined up, with the large number on top, and the smaller number lined up with the ones in the large number.	**43** **x 6**
Do the ones first: But since now this answer has tens and ones in it (18 = 10 + 8), we can only write the ones number (8) underneath, and must carry the ten over to the tens column: Show how to write the ten as a small 1 above:	**3** **x 6** **1 8** **1** **43** **x 6** **8**
Now we will multiply the 6 x 4 = 24. But since we carried over 1 ten, we must add it too: 24 + 1 = 25. This is written underneath in the next two columns:	**1** **43** **x 6** **258**
To summarize the steps: 1. Multiply the ones first: 6 x 3 = 18 2. Write the ones below, and carry the ten. 3. Multiply the tens and ones, and add the carry over: 6 x 4 =24 + 1 = 25	**1** **43** **x 6** **258**

Step 3: • Do another example with a larger carryover number:

Write the numbers carefully lined up, with the large number on top, and the smaller number lined up with the ones in the large number.	**34** **x 7**
Do the ones first: But since now this answer has tens and ones in it (28 = 20 + 8), we can only write the ones number (8) underneath, and must carry the 2 tens over to the tens column. Show how to write the ten as a small 1 above:	**4** **x 7** **2 8** **2** **34** **x 7** **8**
Now we will multiply the 7 x 3 = 21. But since we carried over 2 tens, we must add them too: 21 + 2 = 23. This is written underneath in the next two columns:	**2** **3 4** **x 7** **2 3 8**
To summarize the steps: 1. Multiply the ones first: 7 x 4 = 28 2. Write the ones below and carry the 2 tens. 3. Multiply the tens and ones and add the carry over: 7 x 3 =21 + 2 = 23	**2** **3 4** **x 7** **2 3 8**

NOTE: These problems need addition skills too. Make sure the learners are adding correctly when they carry over to the tens.

Step 4: • Show several more examples, involving the learners:

Examples: **46 x 8 =** **35 x 7 =** **82 x 9 =**

Practice:

- Write the following problems on the board. learners should solve all of them and if they don't finish in class, should do them for homework:

45 x 3	63 x 7	54 x 6	28 x 3	74 x 4	88 x 7

MODULE D

Lesson 90: Games to Practice Long Multiplication

Lesson Learning Objectives:

- To develop confidence in multiplication

Preparation and Materials:

- Chalkboard and chalk
- Pre-made and cut number cards (see Appendix)

Opener:

- Write on the board for learners to solve:
  42 + 6 = **35 + 8 =**

Activities: These are two game-like activities to provide practice with multiplication.

Activity 1: Random Problems

- learners can work in pairs or small groups. Give each group some large number cards and some gray small number cards.
- They should randomly choose one of each kind of card to make a multiplication problem. They should copy it into their notebook and solve it.
- If they are working with other people, they should check with each other and make sure everyone got the same answer.
- They should do at least 3 problems in this way.

Activity 2: Group contest

- Divide the class into groups of 4-5 people each. They should sit together. They can give their team a name if they want. Write the names of the teams on the board for keeping score.

- To play the game, the learners will all close their eyes while you write a multiplication problem on the board. (Choose from the number cards).

- The teams will then work together to solve the problem as quickly as they can. While they are working, you must also solve the problem so you have the answer.

- Once a team has an answer, they raise their hands. They will announce their answer.

- If the answer is correct, the team gets 1 point. For the team to get 5 points, EVERY person in the team must have the problem correctly solved in their notebook. (You must go look at their notebooks.)

- Play this game for as much time as you have left in class. At the end, ask the learners to add up the points for the teams and see which team won.

> NOTE: Even though this game is a contest, the learners should also be helping each other. Make sure the game stays friendly!

Practice:

- Learners should make up 3 multiplication problems to do on their own at home.

- Refer learners to the workbook for further practice

MODULE D

Lesson 91: Fraction Review

Lesson Learning Objectives:

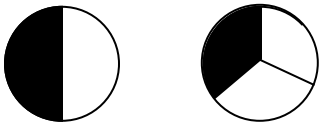
- To review the basic concept of fractions
- To be able to read and write and represent commonly used fractions

Preparation and Materials:

- Chalkboard and chalk
- Cut out fraction shapes (see Appendix)

Opener:

- Draw on the board:

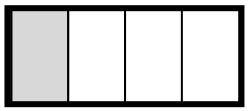


- Which fractions of the circles are shaded? [1/2 1/3]

Activities: 45 minutes

Step 1: Review of fractions

- A whole thing can be divided into pieces. Each piece is obviously smaller than the whole. The pieces are fractions of the whole thing.
  Example: Draw this on the board:



- This whole rectangle is divided into 4 equal parts. Only 1 of the 4 is shaded. So the one piece is 1/4 (one-fourth) of the whole. Each small piece is 1/4 (one-fourth).

- In this example, 2 of the 4 pieces are shaded. Together they are 2/4. (two-fourths)

Step 2:

- Give the learners the cut out shapes with the different shadings. They should look at each piece, write the letter of that shape in the notebook and then write the fraction that is shaded.

- They should pass the cards around until everyone has done all 5 shapes.
  [Answers: A = 4/8 B = 1/4 C = 3/4 D = 4/10 E = 2/12]

Practice:

- learners should make their own drawings showing: 1/2 , 3/4 , 1/4 and 1/10

MODULE D

Lesson 92: Measuring Feet and Inches with Fractions

Lesson Learning Objectives:

- To be able to measure objects in fractions of feet
- To be able to measure objects in fractions of inches

Preparation and Materials:

- Chalkboard and chalk
- Rulers
- Yardsticks or tape measures
- Guest teacher: a local carpenter to demonstrate fraction measurements

Opener:

- Write on the board: How many inches are in 1 foot?

Activities: 45 minutes

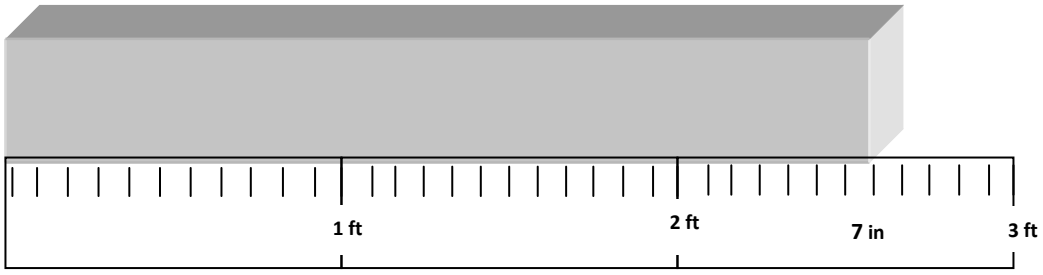
Step 1: Inches as fractions of feet

- There are 12 inches in a foot. So inches are fractions of feet.
- 1 inch = 1/12 of a foot
- 2 inches = 2/12 of a foot
- Give the learners more examples and make sure they understand:
  5 inches = ? (5/12 ft) 8 inches = ? (8/12 ft)

Step 2: Measuring fractions of feet

- Show how to measure the length of an object that is not an exact number of feet. Use an object in the room.

For example:



- In this example, the block is more than 2 feet but less than 3 feet long. The end of the block is at the 7 inch mark.
  So its length is 2 feet and 7 inches. This is written as 2 ft 7 in, or 2' 7"

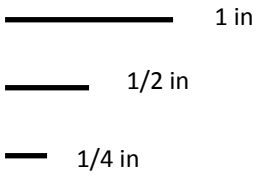
- **This can also be written as 2 7/12 ft. It is said as "two and seven twelfths feet".**

Step 3:

- Do several more examples of measuring objects in the room. Let the learners take turns measuring and writing down their measurements.

Step 4: Fractions of inches

- Give the learners rulers (they can use their paper rulers from Module C).
- Show the learners how the inches are divided into smaller fractions.
- First, the learners should draw a 1 inch line in their notebook and label it 1 in.
- Draw a large ruler on the board to show them where the 1/2 inch mark is. The learners should then use a ruler to draw a 1/2 inch line in their notebook and label it 1/2 in.
- Show them the 1/4 inch mark. The learners should then use a ruler to draw a 1/4 inch line in the notebook and label it 1/4 in.



Step 5: Measuring fractions of inches

- Demonstrate how to measure objects using fractions of inches, and how to write the measurement, such as 3 1/2 in.

NOTE: If there is a carpenter in your town, you could ask him to come to your class as a guest and show how to measure lengths accurately with fractions.

Practice:
- Learners should measure as many objects as they can, practicing their measurement and fraction skills. They should write down the object they measured, and its length. They should measure at least 5 different objects.

- Refer learners to the workbook for further practice

MODULE D

Lesson 93: Using Fractions – A Classroom Shelving Project

Lesson Learning Objectives:

- To be able to apply measurement skills to design shelves
- To be able to gather information to calculate how much the project would cost

Preparation and Materials:

- Chalkboard and chalk
- Tape measures or yardsticks

Activities: 45 minutes

Step 1: Introduction

- Often in our homes we want to add shelves for more storage space. Classrooms also need storage space. So we are going to do the planning needed to build 4 shelves on one wall of the classroom.

- The class will work as a group (or if the class is too big, you can divide them into two groups and each group can do the project separately).

Step 2: The project

- Write the following table on the board so the group can organize itself. The group must find all the information needed to fill in the table.

INFORMATION NEEDED	ANSWERS
Width of each shelf	
Length of each shelf	
Total length of wood needed	
Distance between shelves	

Cost of the wood	
How shelves will be attached to the wall	
Any other important information	

- They should also make a drawing to show where the shelves would be placed on the wall

Step 3:

- ☺ **Discussion:** Once they're finished, you can discuss the project – what was easy, what was difficult, could they make shelves for themselves at home now?

Practice:

- If the learners could not get all the information, (such as the price of the wood, for example) they should get that information and bring it to the next class.
- Refer learners to the workbook for further practice

MODULE D

Lesson 94: Introduction to Percents

Lesson Learning Objectives:

- To understand the relationship between commonly used fractions and percents
- To be able to interpret circle graphs as representations of percents

Preparation and Materials:

- Chalkboard and chalk
- Prepared and cut cards (see Appendix)

Opener:

- Draw the following on the board and the learners should write the fraction of each that is shaded:

Activities: 45 minutes

Step 1: Introduction of the meaning of 'percent'

- 'Percent' means 'out of 100' or 'part of 100'. 100 is a nice easy number to work with, so it is used as an easy way to compare numbers.
- Percents are another way to show fractions.
- The symbol for percent is %

Step 2: Sizes of Percents – Use the pre made cards to show

- 100%: In fractions, we talk about 'one whole'. In percent, one whole is 100%. That means everything, all included. For example, we would say that 100% of people need water to live. 100% of the people in this class have a pencil. If you eat all your food at dinner you have eaten 100% of your food. **100% means ALL**.

100% of this rectangle is shaded:

- Half of 100 is **50**. (50 + 50 = 100) **So the fraction 1/2 is the same as 50%.**

50% of this rectangle is shaded:

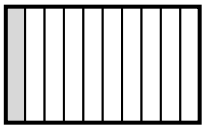
- One-fourth of 100 is **25**. (25 + 25 + 25 + 25 = 100) **So the fraction 1/4 (one-fourth) is the same as 25%.**

25% of this rectangle is shaded:

- Three-fourths of 100 is **75**. [(25 + 25 + 25) + 25 = 100 **]** **So the fraction 3/4 is the same as 75%**

75% of this rectangle is shaded:

- One-tenth (1/10) of 100 is **10**. (10+10+10+10+10+10+10+10+10+10 = 100) **So the faction 1/10 is the same as 10%.**

10% of this rectangle is shaded: 

NOTE: There are percents in between these numbers, such as 15%, or 80%, or 3%. But **100%, 75%, 50%, 25% and 10%** are the most commonly used percents. The learners must memorize these and their fractions.

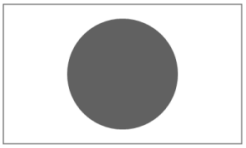
- The learners should have drawings of the percents in their notebooks.

Practice:

- Give the learners the cut out cards and the labels, and they should match them. They should do this with the circles as well: [answers below]

50% shaded

25% shaded



100% shaded

75% shaded

10% shaded

MODULE D

Lesson 95: Showing Information with Percents

Lesson Learning Objectives:

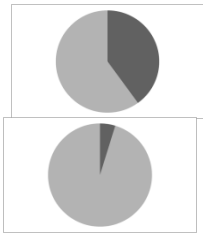
- To be able to interpret percent information presented in circle graphs
- To be able to estimate relative percents

Preparation and Materials:

- Chalkboard and chalk
- Pre made diagrams (see Appendix)

Opener:

- Write on the board.
  - Is this circle more than 50% shaded, or less?
  - Is this circle more than 10% shaded, or less?



Activities: 45 minutes

Step 1: Using Percents

- Remind the learners of the commonly used percents: 100%, 75%, 50%, 25% and 10%, and their fractions.

- Match the percents with words that describe the amounts:
  100% = all
  75% = more than half, or mostly
  50% = half
  25 %= less than half
  10% = much less than half

- Ask some questions:
  - Is this class more than 50% women?
  - Is this class more than 50% men?
  - Do 100% of Liberians own a car?
  - Are more than 10% of the people in this class younger than 20?
  - Does your family eat fish more than 75% of the time? (most of the time?)

Step 2: Using percents to show information

- Each of the diagrams shows information. These are called circle graphs.

- Example: Show the learners the first circle graph. Discuss what the graph tells you.

- The learners can work in pairs or small groups. Give a page with two diagrams to the groups of learners. (don't cut the circles apart)

- They should look carefully at them and talk about the information that the graph tells them. They should compare the two graphs on each page.

Practice:

- Choose some aspect of your family to show with a circle graph.

- Refer learners to the workbook for further practice

MODULE D

Lesson 96: Project 1: Class Surveys and Making Bar Graphs

Lesson Learning Objectives:

- To be able to organize a survey
- To be able to gather and organize the information from a survey
- To be able to generate a bar graph from survey data

Preparation and Materials:

- Chalkboard and chalk
- Large paper

Opener:

- Write on the board: *What is a survey?* Discuss what a survey is and how a survey can be useful.

Activities: 45 minutes

Whole Class Project as a demonstration of how to take a survey

In this part, you will take the whole class through the process of asking a survey question, taking the answers as information and making a bar graph from the information.

Step 1: Setting up the survey: What are people's favorite colors?

- Determine the question to be asked. For example, "What is your favorite color?"

- Since many people will be giving their answer to this question, we need a way to keep track of the answers. We can make a table with a set of answers we expect people might give and then some blank, open answers as well.

Colors	Tally of Answers	Final

Here are some examples:

- When each person answers, we make a tally mark by the answer they gave.

		Totals
Blue		
Black		
Orange		
Green		
Yellow		
Red		

Step 2: Taking the Information

- Once you have this table of colors written on the board, go around the room and ask each person his or her favorite color and record the tallies in the table.

- **Here's an example of what it might look like. This is called the DATA from the survey and this is called a DATA TABLE:**

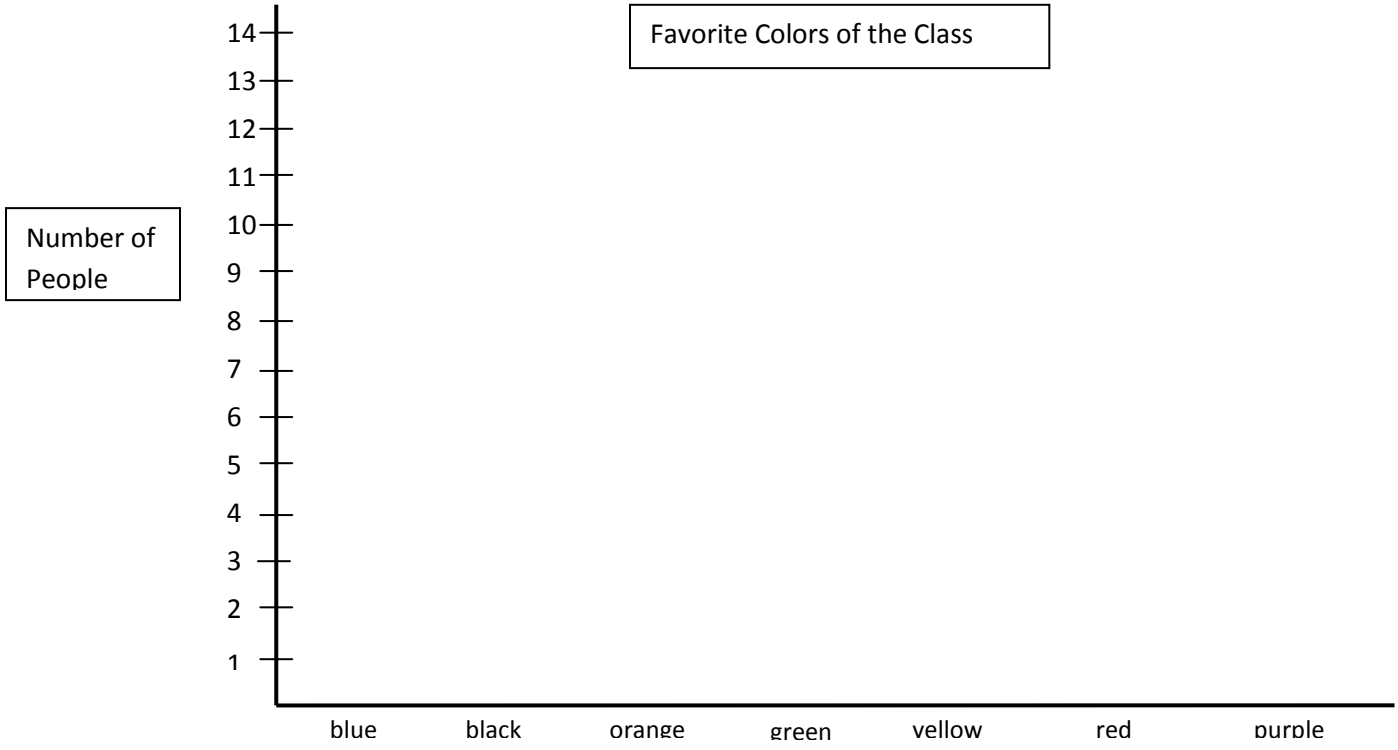
Colors	**Tally of Answers**	**Final Totals**
Blue	ll	2
Black	ll/ll	5
Orange	l	1
Green		0
Yellow	ll/ll ll/ll ll	12
Red	lll	3
Purple	l	1

NOTE: Make sure you show the learners how to mark the 5th count when tallying:

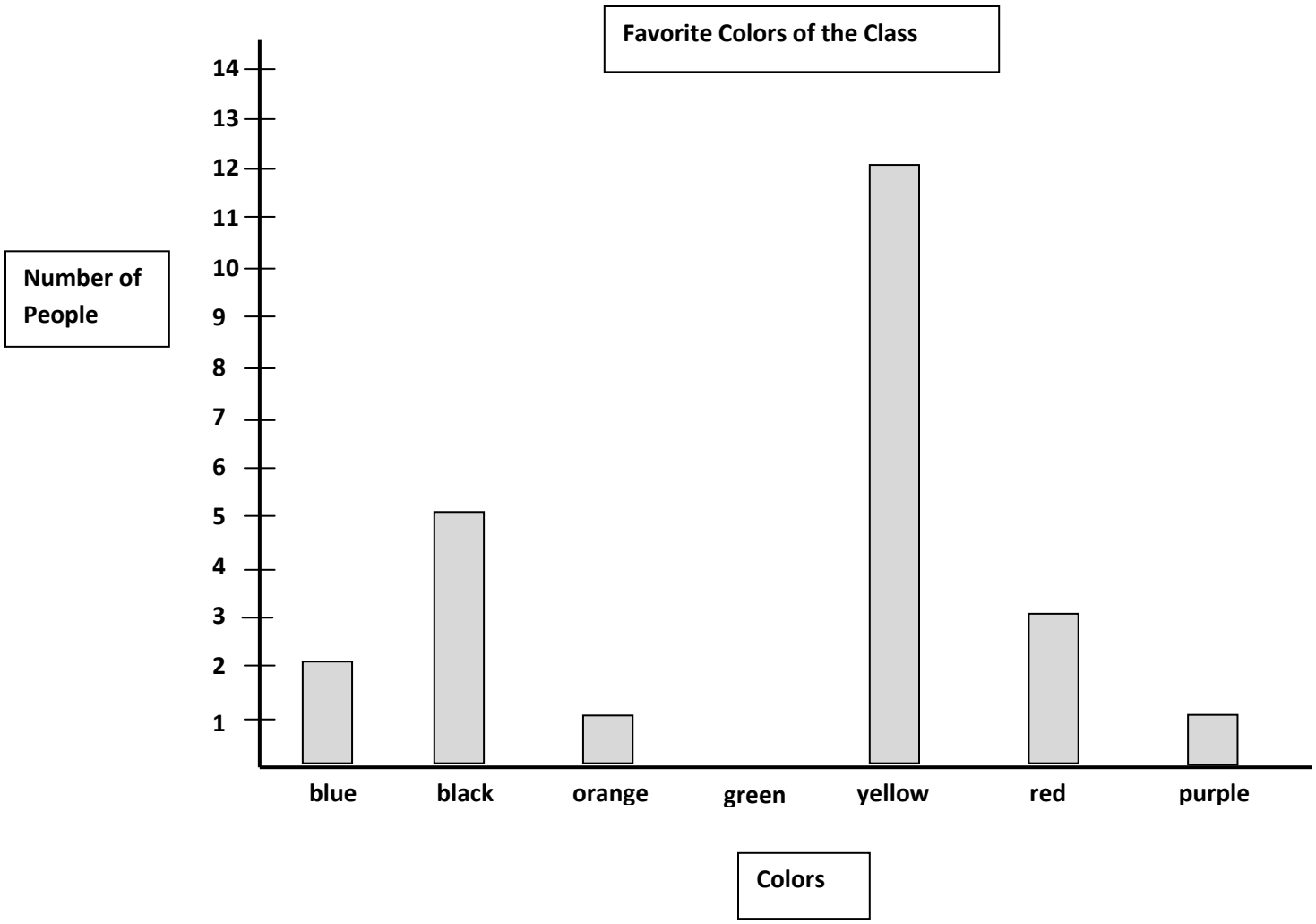
|	= 1
||	= 2
|||	= 3
||||	= 4
𝍸	= 5
𝍸 |	= 6
𝍸 𝍸	= 10

Step 3: Presenting the data – making a bar graph

- Discuss with the learners how it is easier to see the results of the data if it is in a 'picture' form. One picture that can be made with numbers is a bar graph.
- Draw the following on the board and explain each part shown:



- Now use the answers in the data table to make the bar for each answer. Explain each step as you go, especially explaining the numbers on the side and how you know how tall to make each bar:



NOTE: You should make this graph on large paper and hang it in the room for the learners to see and review later.

- After you have made the bar graph with the class on the board, ask them to explain what it tells them about people's favorite colors – what can they see from the bars?

- ☺ **Discuss:** Why is this a good way to show the results from the survey?

Practice:

- Repeat exactly the same process with the whole class, asking a different question this time, tallying the answers, and making a bar graph.

- The learners should also make the same table and graph in their notebooks.

- Some other ideas for questions are:
  - What is your favorite food?
  - How many people live in your home?
  - Age.

> **NOTE**: if doing a survey of age, you can use a *range* of numbers, such as:
>
> Age 15 to 20,
> 21to 25,
> 26 to 30,
> 31 to 35,
> 36 to 40,
> 41 to 45,
> 46 to 50, etc.

- If you run out of time in class, the learners should take home the table of tallies with answers to the survey and draw their own bar graph at home and bring to class next time.

- Refer learners to the workbook for further practice

MODULE D

Lesson 97: Project 1: Continued – More Class Surveys

Preparation and Materials:

- Chalkboard and chalk
- Large paper

Opener: None

Activities: 45 minutes

Step 1: Review last class bar graphs.

(Should be hanging on the wall from last class)

Step 2: Small survey projects in the class

- The learners will now be responsible for making their own mini-survey of the class.

- Over the next two lessons (this one and the next one) learners will design a survey, take the data and record all the answers in a table and then make a bar graph showing the results of their survey.

Write the steps of the process on the board and discuss them:

1. **Decide on a question for the survey.**
2. **Make a table (data table) to record the answers people give.**
3. **Take the survey – ask people the question and record answers.**
4. **Tally the data.**
5. **Make the bar graph.**

- learners can work alone, or in pairs.

- Help the learners if they need it. Once they are ready to ask the survey questions they will have to walk around the room asking each other.

NOTE: Make sure the learners know that by the end of this class, they should have asked their question and taken all their data. **The next lesson will be for making the bar graphs.**

MODULE D

Lesson 98: Project 1: Conclusion of Class Surveys

Preparation and Materials:

- Chalkboard and chalk
- Large paper

Opener: None

Activities: 45 minutes

Step 1: Finishing projects

- Give the learners the time they need to finish making their bar graphs from the previous class.
- IF they don't remember how to make the graph, remind them to look at the example hanging on the wall.

Step 2: Presentations

- Try to save the last 10 minutes for a few people to show their bar graphs. Ask them to explain the results and what they learned from it.
- All the groups should hang their graphs in the room.

Checklist for checking bar graphs:

- Does it have a title?
- Are the bars lined up with the numbers?
- Do the numbers match the tallies?
- Is it neat?

MODULE D

Lesson 99: Project 2: Community Survey, Part 1

Lesson Learning Objectives:

- To use survey and graphing skills to conduct a survey of community issues
- To present information and interpret the results

Preparation and Materials:

- Chalkboard and chalk
- Large paper

Opener: None

Activities: 45 minutes

Step 1: Introducing the project

- This project will take the next 3-4 classes. The class will work together to gather information about their community through taking surveys and will then make bar graphs to show the information.

- learners can again work alone, or in a small group of 2-3 people.

Step 2: Survey techniques out in the community

- Discuss with the learners these basic but important parts of taking a survey:

  - Don't use names of the people who answer the questions. Don't say or write things like, "Stella said her favorite food is chocolate." Make sure people know that you won't be using their names.
  - Don't try to get right or wrong answers in a survey. It's not a test!
  - If you get other interesting information, if people share more with you, you can include that information in your results if you want. LISTEN to what people say!
  - Try to talk to a lot of different people of different ages, not just people you know.

- Ask as many people as you can. More data is always better!
- If people don't want to answer your question, don't force them. Just ask them to help you with your project, but if they don't want to, it's ok.
- Never make up the answers! If you don't have data, don't make a graph. A graph from a survey must always be honest and true.
- Never change people's answers. Even if you don't like the information you're getting, you can't change it. You just have to use it.

Step 3: Deciding what to survey about

- Discuss some possible topics to conduct a survey on. Here are some ideas for questions, but the learners will have other ideas:

  - What are the top three issues facing our community?
  - What is the biggest health issue for adults in our community?
  - What is the biggest health issue for children in our community?
  - What do people like the most about our community?
  - What food do people eat most in our community?

- Write these and any other ideas on the board.

- Once the class has given more ideas, the learners should get in their small groups and begin to plan their survey.

- In today's class time they should:

  1. Decide what question they are going to ask and write it in their notebook.
  2. Make the table where they are going to record the answers from the people they ask.
  3. Each group member should have this in their notebook so each person can do surveying over the next two days.

4. Discuss where they are each going to take their surveys, so they don't overlap in the same area.
5. Decide how many people each group member is going to survey. (A suggestion is 10 people each, at least.)

Practice / Homework

- Each person now has a survey question to ask and a place to record the answers. They should conduct their survey in the community before the next class and bring their results to the class.

MODULE D

Lesson 100: Project 2: Community Survey, Part 2: Data

Preparation and Materials:

- Chalkboard and chalk

Opener: None

Activities: 45 minutes

Step 1: Checking in

- Ask the groups how their surveying went, what they experienced, how people reacted?

Step 2: Continuing the survey work

- Write today's work on the board and discuss with the class:

  1. Sit with your group and combine your survey answers into one data table.
  2. Begin to plan how to make a bar graph with the data.
  3. Make a small, rough bar graph with your data.

- The learners should take their time to work with their data and discuss everything as they go.

- You may need to help them with combining their data. Remind them they can add the numbers.

- Refer learners **to the workbook for further practice**

MODULE D

Lesson 101: Project 2: Community Survey: Conclusion, Bar Graphs and Results

Preparation and Materials:

- Chalkboard and chalk
- Large paper

Opener: None

Activities: 45 minutes

Step 1: Making final bar graphs

- Today the groups should make large, final bar graphs from their surveys. They should take their time and make sure their graphs are complete and neat.
- They can also decorate them if they wish.

Step 2: Presentations

- Once everyone is finished, in the last 15-20 minutes of class, each group should present their survey and their graph showing the results.
- They should talk about what these results mean for their community, and what they've learned.
- Graphs should be hung on the walls.

Step 3: Next Steps

- After these presentations, the learners may wish to discuss anything they want to do about the information they learned, to try to address any issues or ideas that came up.
- They may also talk about other people they would like to share their results

with, such as local government, or the local newspaper, etc.

Practice:

- Look in the newspaper for any other results, surveys, or graphs that give information and bring them to class next time.

MODULE D

Lesson 102: Project 3: Family Finance, Part 1: Setting Up Record-Keeping

Lesson Learning Objectives:

- To record expenses in an accounting format
- To be able to use this financial information to analyze a family's expenses

Preparation and Materials:

- Chalkboard and chalk

Opener:

- Write the following numbers on the board, and ask learners to add them:

56 **34** **98** **25** (answer = 213)

Activities: 45 minutes

Step 1: Introduction

- In this project, learners will individually keep track of their family's expenses for several days and then make graphs to see what they spend the most money on.

Step 2: Keeping track of expenses – making a data table

- The learners will be making a data table in their notebooks where they can record what they (or their family) spend money on every day.

- Ask the learners to design a data table where they could record the date, the amount spent and the items purchased.

- They should probably first come up with a list of basic categories of things that they buy.

- What are some categories of expenses? (example: fresh food, ready-made food, clothing, medicine or health care, alcohol drinks, candy, school supplies, saving money, etc.)

- Let them come up with their own design. They may want to use more than one page of their notebook.

- If they are interested, you can also share with them these styles with an example of how it would be filled out: (see Appendix for larger versions to show learners)

- Make sure you explain how to read the table.

	Dollars Spent for Items						
Date	**Fresh food**	**Ready food**	**Alcohol**	**School things**	**Medicine**	**Clothing**	**Saved**
Tuesday	25			7			9
Wednesday	20	18					
Thursday		20		7			

- Another way. This style requires more writing each day:

Date	**Item**	**Dollars**
Tuesday	Fresh food (bananas)	25
	Pencils	7
	Saved	9
Wednesday	Fresh food (potatoes)	20
	Ready food (bread)	18

Thursday	Ready food (cookies)	20

- The learners should keep their data table with them during the day so that they can record what they spend money on. They should do this for one week.

Step 3: Predicting

- Ask the learners what they EXPECT their data to show:

  - What do they (the family) spend the most money on every week?
  - What do they (the family) spend the least money on every week?
  - Are they satisfied with how they and their family spend their money?

- Write the following sentences on the board and ask the learners to copy them into their notebooks, answering in the blanks:

  - My family spends most of its money on _____ every week.
  - My family should spend less money on _____ every week.
  - My family should spend more money on _____every week.

Practice:

- Homework: Keep good records of what you spend money on! We will do the graphs in one week.

MODULE D

Lesson 103: Project 4: Nutrition, Part 1: Introduction to Nutrition

Lesson Learning Objectives: (3 lessons)

- To be able to enter information into a table
- To be able to interpret a circle graph
- To understand basics of nutrition and become aware of eating habits
- To plan a garden

Preparation and Materials:

- Chalkboard and chalk
- Nutrition information cut-out cards (see Appendix)

Nutrition list (see Appendix)

Activities: 45 minutes

Ste**p 1: What do we eat?**

- Ask the learners to come up with a list of foods they eat. Write these on the board as they share them.

Step 2: Types of foods - information cards

- Give the cards to the learners. Ask one person to read a card. Discuss it, and discuss other foods that come in that category.
- Post it on the board.
- Do this with all 6 nutrition cards.

Step 3: What types of food do we eat?

- In their notebooks, the learners should make a table where they can list the foods they eat (not the whole class, just for themselves) and then identify what types of foods they are.

- Here is a sample table:

	Carbohydrate	Protein	Vitamins	Fats	Not helpful (sugar, alcohol)
Rice					
Bananas					
beer					

- Once they have made the table, they should start listing all the foods they can think of that they eat.

- Then they should start making checkmarks in the columns for each food. Some foods may have more than one checkmark.

  Example:

	Carbohydrate	Protein	Vitamins	Fats	Not helpful (sugar, alcohol)
Rice	√				
Bannas			√		
Beer					√
Fish		√			
Fried		√		√	

eggs					
Boiled greens			√		
Donuts	√			√	√

- They should look at what they eat most of and they may want to make a bar graph to show the results

Step 4: What we should eat and how much

- Show the circle graph in the Appendix. It shows the breakdown of types of foods we should eat to be healthy (approximately).

Practice:

- At home, look in your kitchen and see what kinds of foods your family usually eats. Include these on your chart.

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MODULE D

Lesson 104: Project 4: Nutrition, Part 2: Planning a Garden

Lesson Learning Objectives:

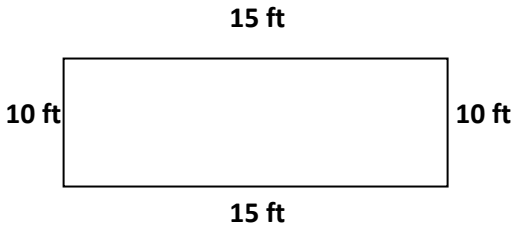
- To use nutrition information as well as measurement and calculations to design a garden

Preparation and Materials:

- Chalkboard and chalk
- Large paper
- Rulers

Opener:

- Draw on the board→



- What is the perimeter of this shape?

Activities: 45 minutes

Step 1: Gardening habits discussion

- Ask learners if they have a vegetable garden. If so, what do they grow in it?
- What types of foods are these? (protein? carbohydrates? Etc)

Step 2: Planning a garden

- In this activity, learners will be planning a garden.
- If they already have a garden and are happy with it, then they can instead make a plan that could be used by someone else. If, for example, they were teaching

someone how to do gardening, they would share this garden plan with them.

Step 3: The parts of the plan

- Their plan must include:
  - how big the garden will be (making a drawing with measurements)
  - what shape it will be
  - how much fence will be needed to go around the garden (the perimeter)
  - the types of plants that will be grown in the garden (types of fruits, vegetables or flowers)
  - how much the seeds cost
  - how many inches apart to plant the different kinds of seeds
- Write this list on the board. You might want to do some examples.
- They can do this with drawings with written work as well as.

Practice:

- They can look at other gardens in their neighborhood for ideas. How many people have gardens and grow vegetables for vitamins? Do they sell the food, or eat it, or both?

MODULE D

Lesson 105: Project 3: Nutrition, Conclusion: Finishing the Gardens

Preparation and Materials:

- Chalkboard and chalk
- Large paper
- Rulers

Activities: 45 minutes

Step 1: Finishing their garden plans

- The learners can work on their garden plan projects.
- Check that they are making drawings and measurements.

Step 2: Presentations

- The learners can then present their drawings to the class and then hang them in the classroom.

NOTE: In the next class, you will be finishing the Family Finance Project (Project 3). Remind the learners to bring their records of what they have been buying for the week!

MODULE D

Lesson 106: Returning to Project 3: Family Finance, Conclusion – "Where Does The Money Go?"

Lesson Learning Objectives:

- To be able to analyze data from a long-term finance project

Preparation and Materials:

- Chalkboard and chalk
- Large paper

Opener: None.

Activities: 45 minutes

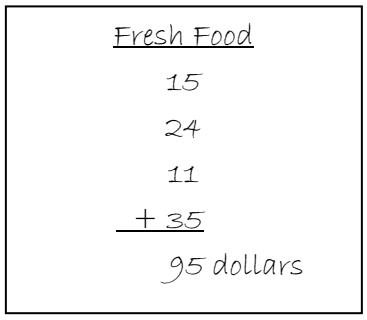
Step 1: Introduction

- In this class, the learners will be taking their data about what they spent their money on and making bar graphs to see where they spend most of their money.
- For one week, learners have been writing down how much they spend. But in a long list, it's hard to know what it means.
- It is easier to use the information if it is in a bar graph.

Step 2: Organizing the data

- learners should have their notebooks out with their records of what they spent money on. Even if they sometimes forgot and didn't write everything down, they should use what they have.
- They must decide the major categories that they spent money in (such as fresh food, ready food, clothes, medicine and whatever other things. They should write one category at the top of each piece of paper.

- They must then find out how much they spent in each category. They have to add them up.
  For example:



Step 3: Making the bar graph

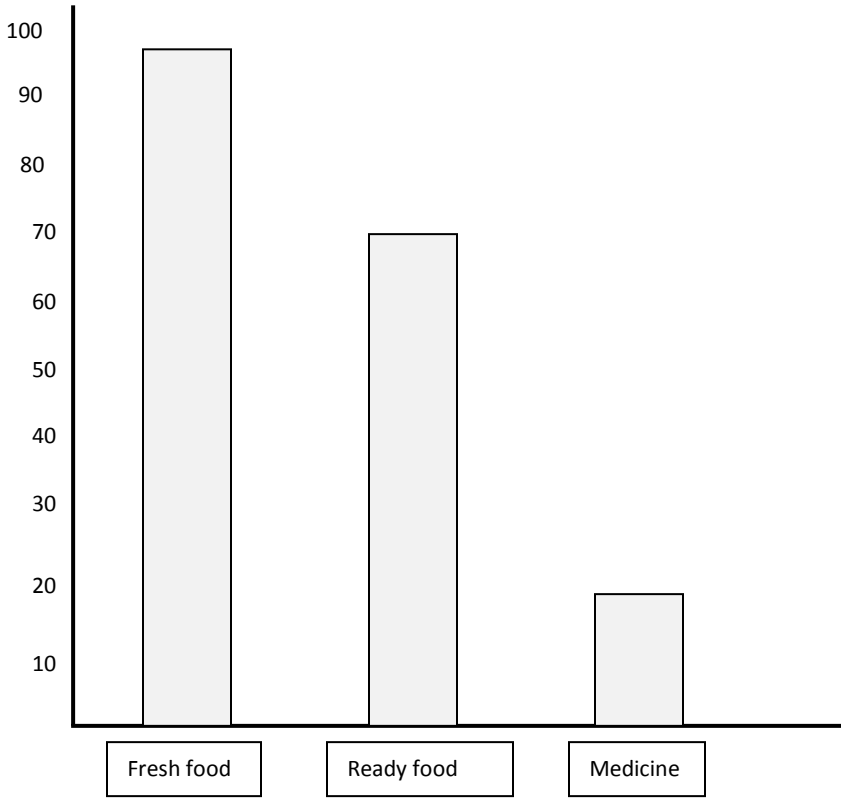
- Once they have all the totals, they should write them together on one page so it's easy to see the totals.

- Then they can begin making their bar graph on large paper.

- The highest number on the left side of the graph should be a little more than the highest total.

  See example below:

Fresh food = 95 dollars
Medicine = 20 dollars
Ready food = 70 dollars



NOTE: Knowing how to put the numbers on the side of the graph can be hard. Make sure you help the learners organize their graph with the numbers on the left side. It may be best to count by 10's like in this example.

Step 4: Learning from the information

- The learners should then talk about what the graphs and the totals show them and what they spend most of their money on.
- They can decide if they are happy with this, or if they want to change what they spend money on.

Practice:

- Give the learners time to finish their graphs. If they do not finish, they can work on them at home.

MODULE D

Lesson 107: Review of Level 1

Lesson Learning Objectives:

- To review topics from this Module and all of Level 1

Preparation and Materials:

- Chalkboard and chalk
- Review cards (in appendix) cut out

Opener:

- None. Entire time is dedicated to reviewing.

Activities: 45 minutes

Step 1: Review

- Remind the learners that the next class will be an evaluation of Module D. Review with the learners the topics you worked on during this module:

Topics Studied in Module D

- Add and subtract in numbers up to the 1000's
- Multiply 2 digit by 1 digit numbers
- Organize and conduct a survey
- Organize information in a data table
- Make a bar graph from data in a table
- Interpret meaning from a bar graph
- Understand commonly used percent fractions
- Interpret meaning from percentage information presented in circle graphs
- Apply measurement and calculation skills to real situations
- Identify major types of nutritional foods

- This review session will be the same as Module C. The review cards should be distributed among the class and the learners should answer the questions of as many cards as they can during the class.

- They should work alone as much as possible, since the evaluation will be done independently. But to check their work they can compare their answers with other people who have solved the same card already.

NOTE: If a learner discovers his or her weakness in a particular area, they should be encouraged to ask you for help or review in that area.

Practice:

- Learners should then continue to practice and study at home to prepare for the evaluation.

MODULE D

Lesson 108: Evaluation

Lesson Learning Objectives:

- To be able to assess learners' mastery of the topics in Module C, as well as earlier fundamental skills

Preparation and Materials:

- Chalkboard and chalk
- Ruler
- Prepared evaluation cards (see Appendix)

Opener:

- None – all time is for evaluation

Activities: 45 minutes

Step 1:
- Review with the learners how evaluation is done – that they must work alone and do their best.

Step 2:
- Write the evaluation questions on the board earners should answer the questions on their paper and then give them to you to check.

Step 3:
- If you have time and everyone finishes, you should go through the evaluation questions with the class right then, answering and explaining the answers, so that the learners can immediately see what they did correctly as well as where they need to keep practicing.

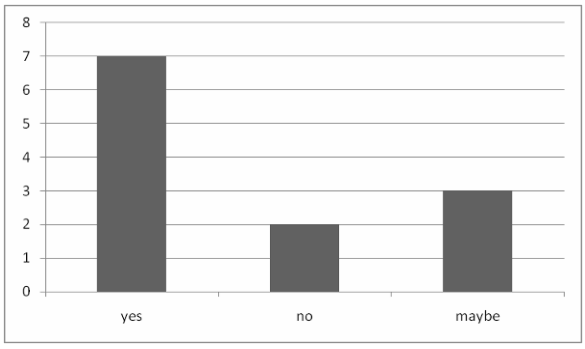
NOTE: As always with evaluation and assessment, you as the Facilitator need to carefully note any learners who need extra help, who are having trouble learning the concepts. Then try to find a way to help them further.

Evaluation Questions

(To be written on the board)

1. Draw a line 2 ½ inches long.	2. Draw a circle with 75% shaded.	3. 736 + 185	4. Add the numbers 34, 15 and 27.
5. At the store your bill is $238. You give $250. How much change will you get back?	6. 21 x 3	7. 63 x 7	8. See below.

8.

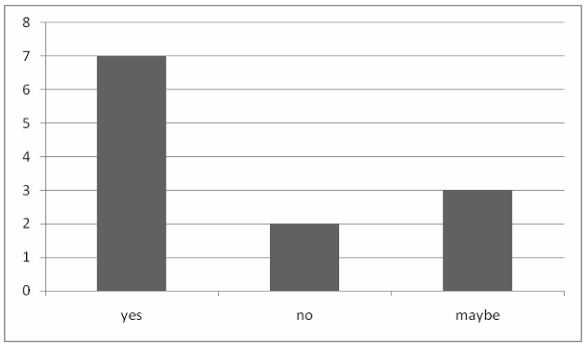


People were asked, "Do you eat nutritious meals every day?"
Their answers are on the graph. What can you tell from this graph?

Evaluation Answers

1. Draw a line 2 ½ inches long.	2. Draw a circle with 75% shaded. 	3. 736 + 185 **921**	4. Add the numbers 34, 15 and 27. **76**
5. At the store your bill is $238. You give $250. How much change will you get back? **$12**	6. 2 1 x 3 **6 3**	7. 6 3 x 7 **4 4 1**	8. See below.

8.



People were asked, "Do you eat nutritious meals every day?"
Their answers are on the graph. What can you tell from this graph?

Most people said Yes (7), only 2 people said No (2) and some people don't know and said Maybe(3)

Appendix of Materials for Use in Module D

These are materials to be used in lessons as noted. Diagrams may be copied, or they can be cut out from these pages for use in class.

Lesson 85 – Number Cards for Addition and Subtraction

75	185	62	40	815
47	18	320	98	7
68	367	222	800	458
576	55	471	11	99
86	23	851	53	36
406	943	72	49	15

Lesson 86 – Price Cards: Make Accurate Prices For Items Such As:

Comb	**Shoes**	**Candy**	**Pen**
Socks	**Sandals**	**Bracelet**	**Towel**

Or make your own:

Lesson 87 – Multiplication Flashcards to be Cut Out.

1 x 1 =	1 x 2 =	1 x 3 =	1 x 4 =	1 x 5 =
2 x 1 =	2 x 2 =	2 x 3 =	2 x 4 =	2 x 5 =
3 x 1 =	3 x 2 =	3 x 3 =	3 x 4 =	3 x 5 =
4 x 1 =	4 x 2 =	4 x 3 =	4 x 4 =	4 x 5 =
5 x 1 =	5 x 2 =	5 x 3 =	5 x 4 =	5 x 5 =
6 x 1 =	6 x 2 =	6 x 3 =	6 x 4 =	6 x 5 =
7 x 1 =	7 x 2 =	7 x 3 =	7 x 4 =	7 x 5 =
8 x 1 =	8 x 2 =	8 x 3 =	8 x 4 =	8 x 5 =
9 x 1 =	9 x 2 =	9 x 3 =	9 x 4 =	9 x 5 =

1 x 6 =	1 x 7 =	1 x 8 =	1 x 9 =	1 x 10 =
2 x 6 =	2 x 7 =	2 x 8 =	2 x 9 =	2 x 10=
3 x 6 =	3 x 7 =	3 x 8 =	3 x 9 =	3 x 10=
4 x 6 =	4 x 7 =	4 x 8 =	4 x 9 =	4 x 10=
5 x 6 =	5 x 7 =	5 x 8 =	5 x 9 =	5 x 10=
6 x 6 =	6 x 7 =	6 x 8 =	6 x 9 =	6 x 10=
7 x 6 =	7 x 7 =	7 x 8 =	7 x 9 =	7 x 10=
8 x 6 =	8 x 7 =	8 x 8 =	8 x 9 =	8 x 10=
9 x 6 =	9 x 7 =	9 x 8 =	9 x 9 =	9 x 10=

Lesson 88 – Multiplication Story Problems (Without Carrying Over)

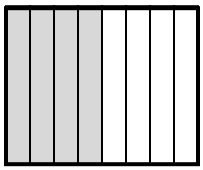
Lorpu makes 20 dollars a day. How much money will she make in 4 days?
Watta wants to have a party. She wants to give each guest 3 sweets. If 30 people come, how many sweets will she need for them?
How many days are in 3 weeks? Each day it rained 3 inches. How many inches of rain fell in 3 weeks?
Fallah spends 3 dollars a day on candy. How much money would he spend on candy in 11 days?
Thelma wants to make some shelves for her kitchen. She wants 4 shelves. They must be 21 inches long each. How many inches of wood must she buy to cut?
Each box contains 4 quarts of cooking oil. If you have 12 boxes in your shop, how many quarts of oil do you have to sell?
How many inches are in 1 foot? If 4 year old Hawa is 4 feet tall, how many inches tall is she?

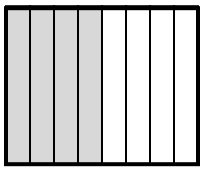
Lesson 90 - Multiplication Number Cards

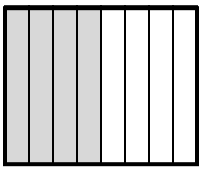
45	52	86	38	91
67	73	24	18	22
63	57	34	28	16
44	93	75	84	40
x 2	x 3	x 4	x 5	x 6

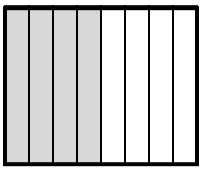
x 7	**x 8**	**x 9**		

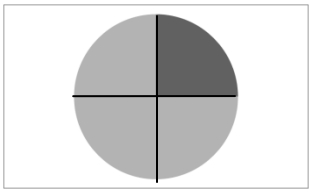
Lesson 91 –Shaded Fraction Shapes – Cut on the dotted lines to make cards

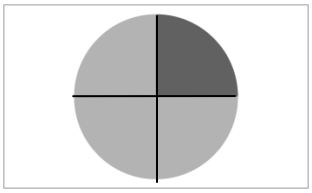
A 

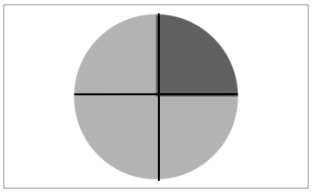
A 

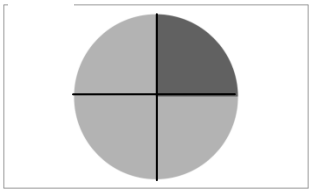
A 

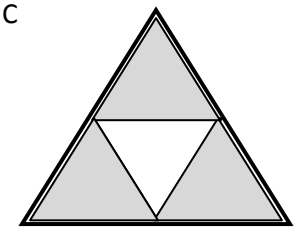
A 

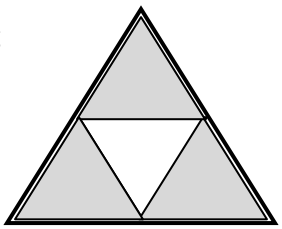
B 

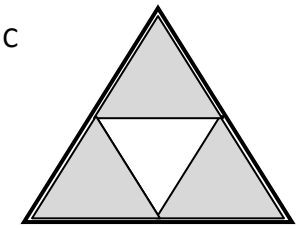
B 

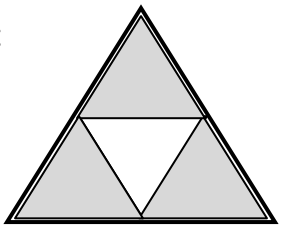
B 

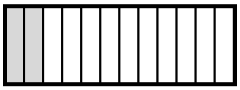
B 

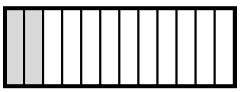
C 

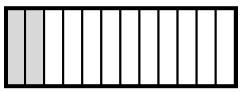
C 

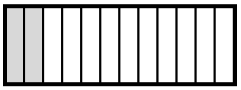
C 

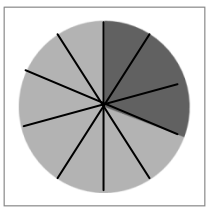
C 

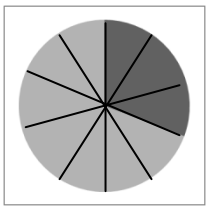
D 

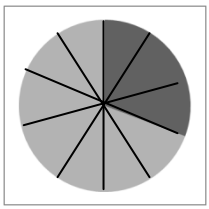
D 

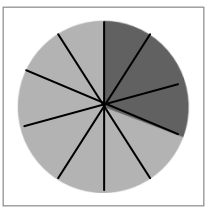
D 

D 

E 

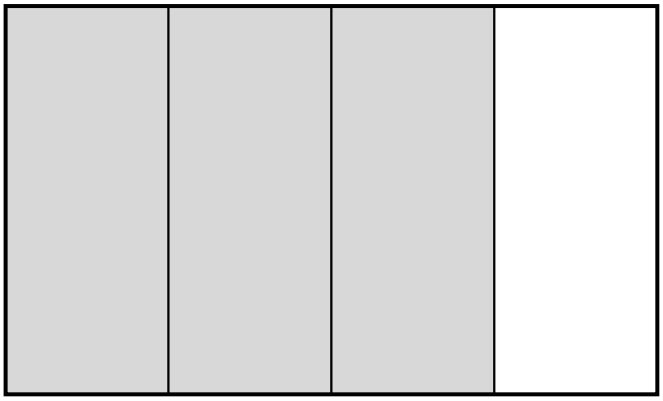
E 

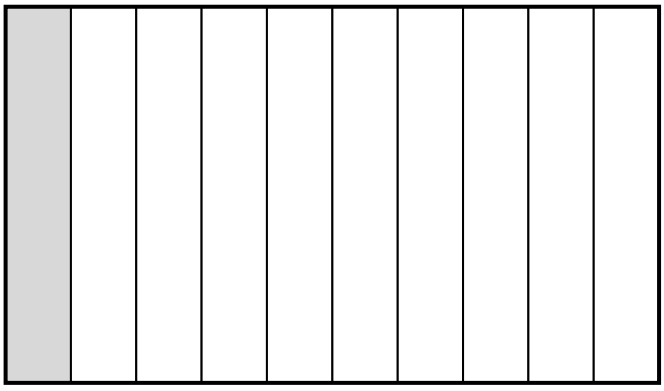
E 

E 

Lesson 94 – Introduction to Percents

(Cut out cards, and match with label cards on next page)





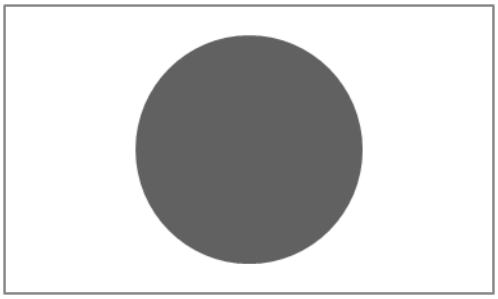
100 % = 1 whole

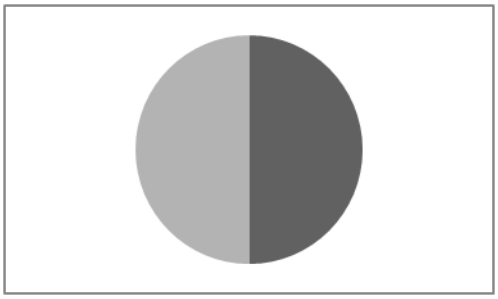
75 % = 3/4

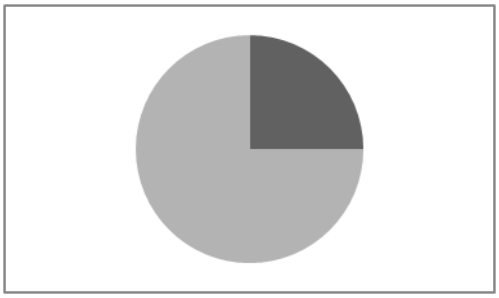
50 % = 1/2

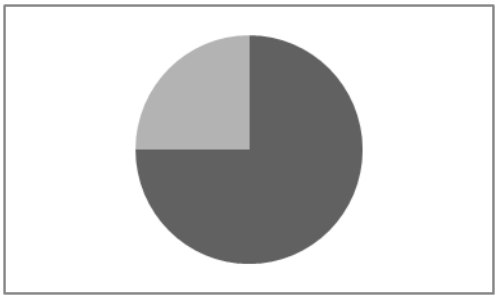
10 % = 1/10

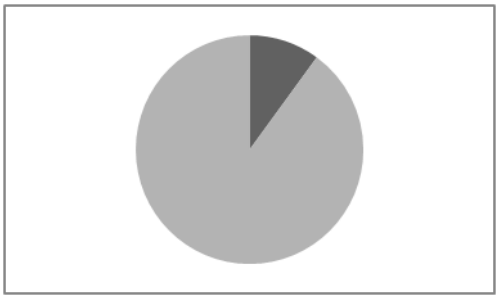
25 % = 1/4





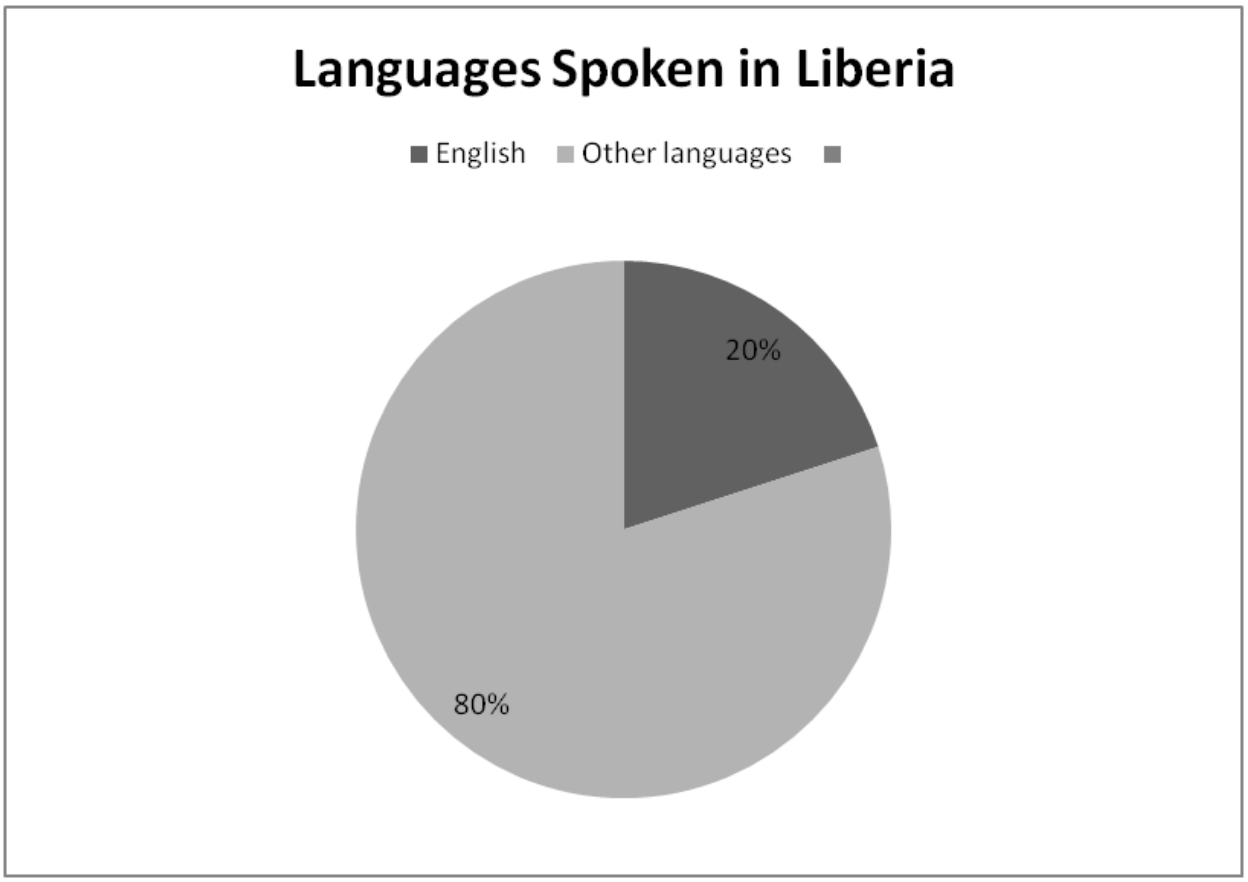






Lesson 95 - Using Percents

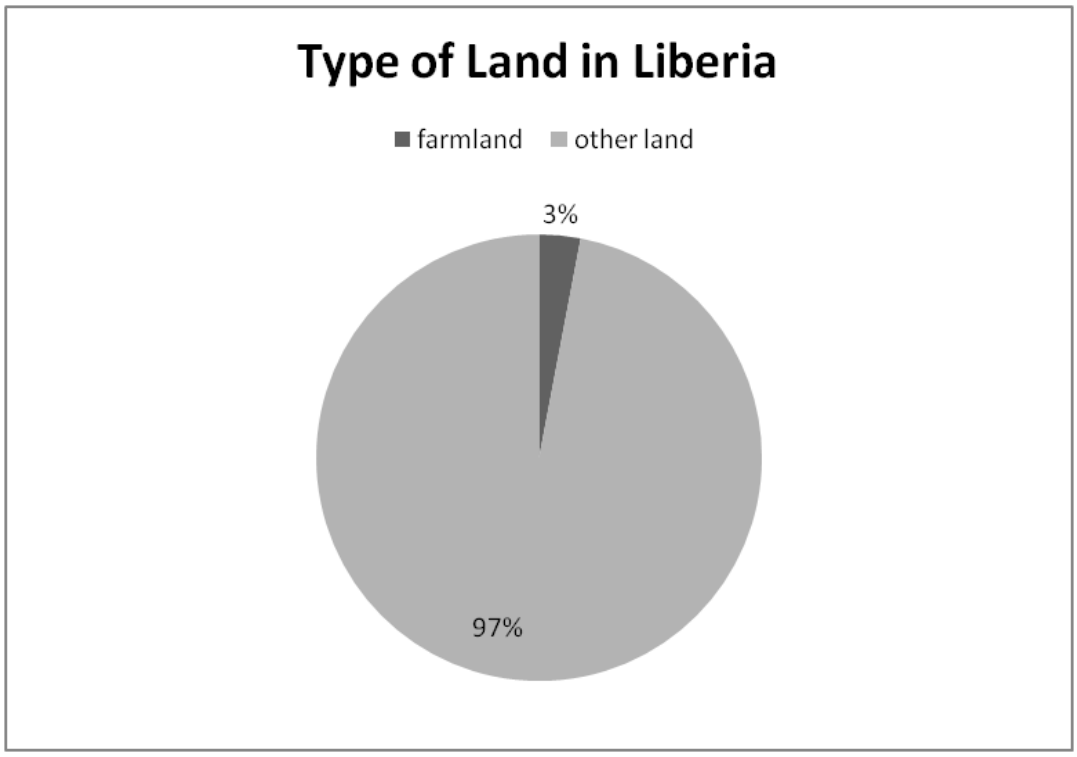
(Sample diagram for demonstration)

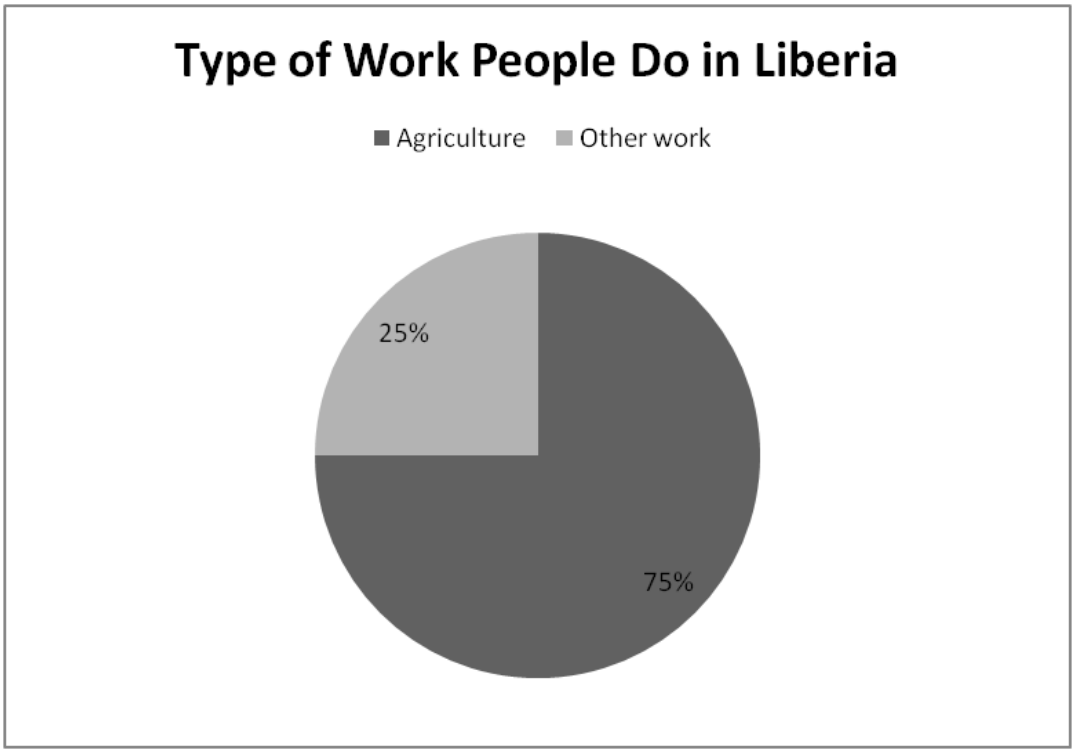


What does this graph tell us?

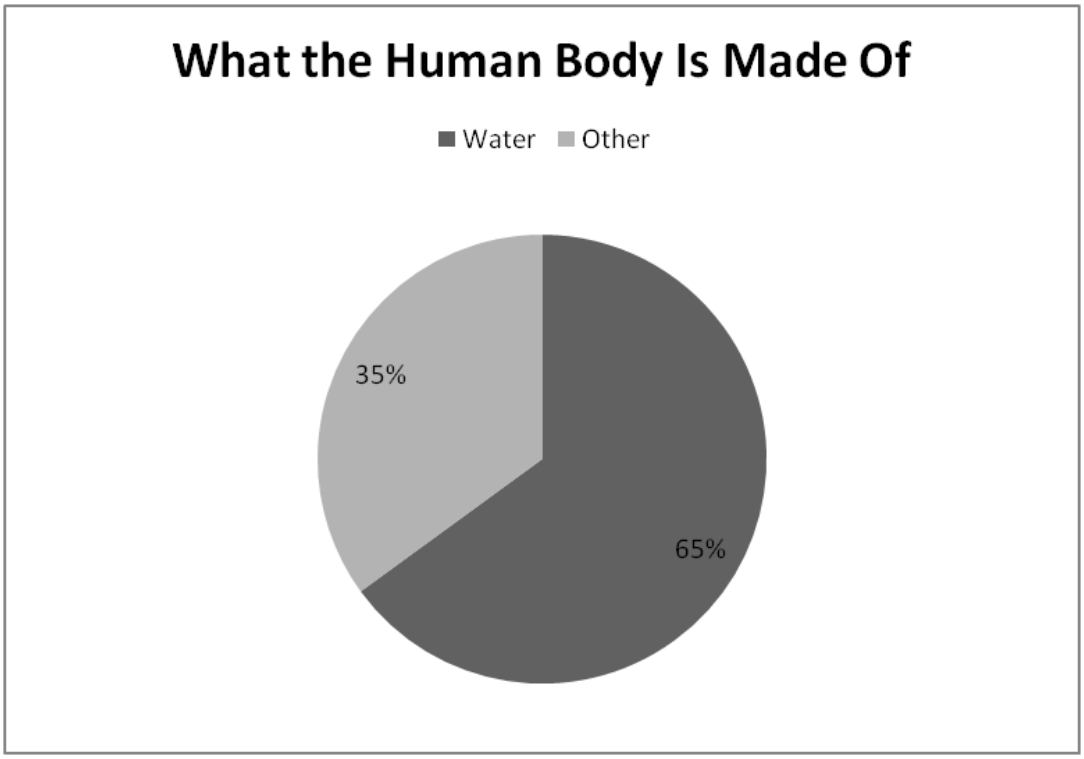
It shows that most people in Liberia don't speak English. Most people speak other languages.

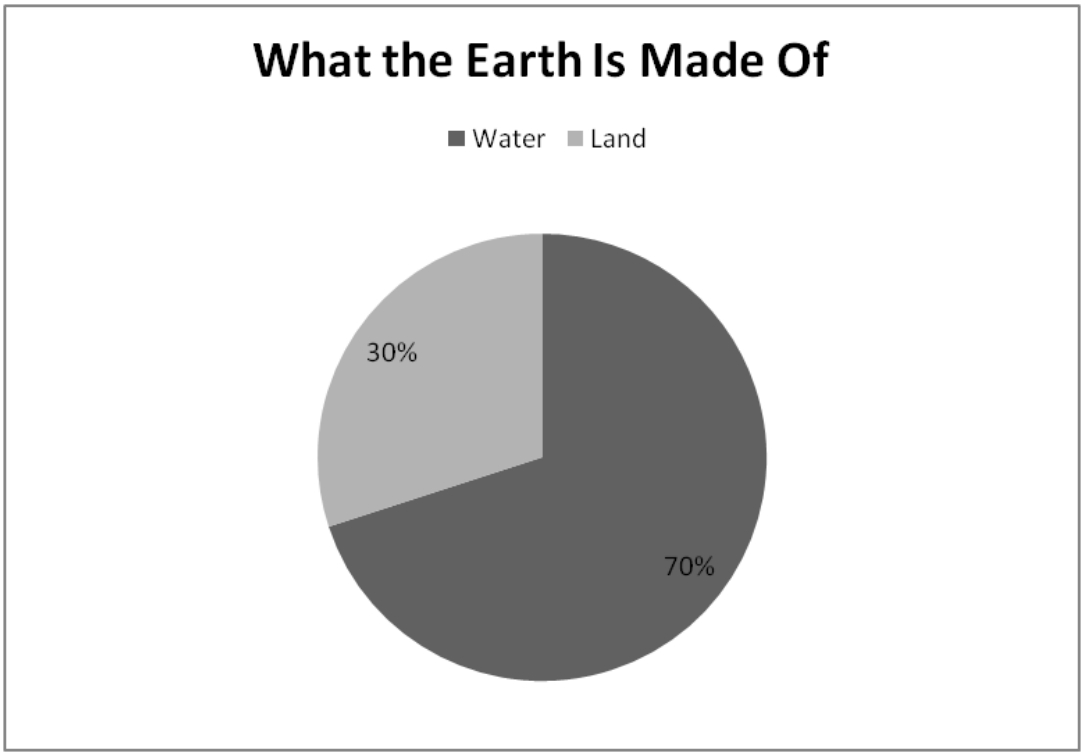
Lesson 95 Diagrams (do not cut apart)



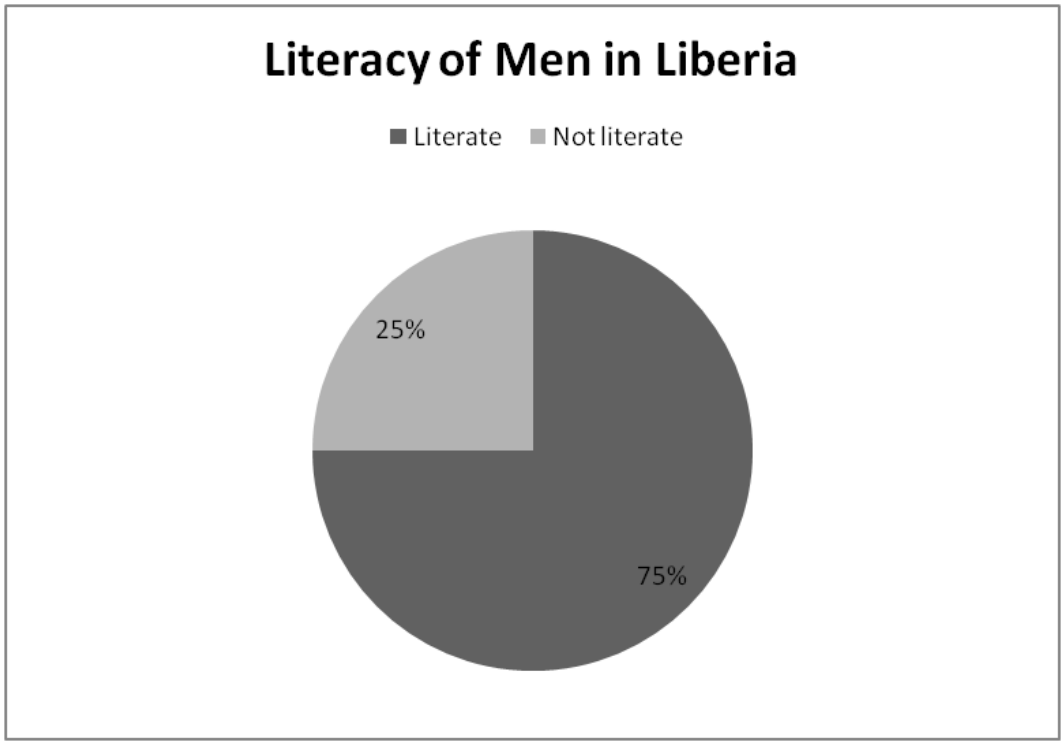


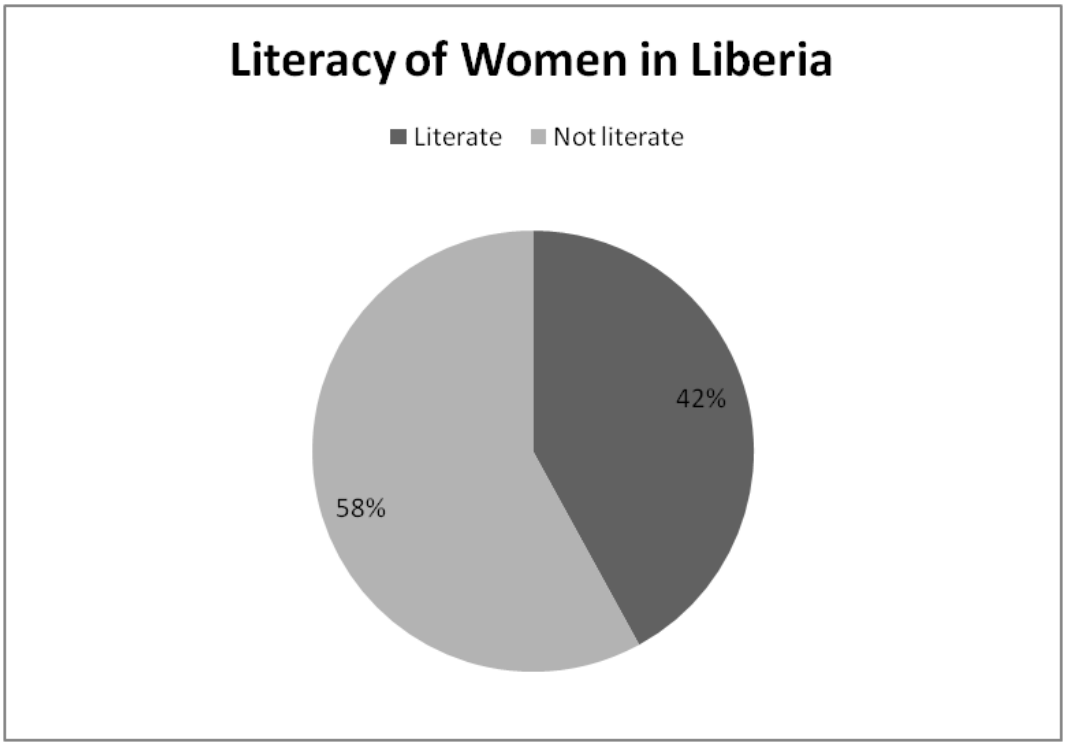
Lesson 95 Diagrams (do not cut apart)



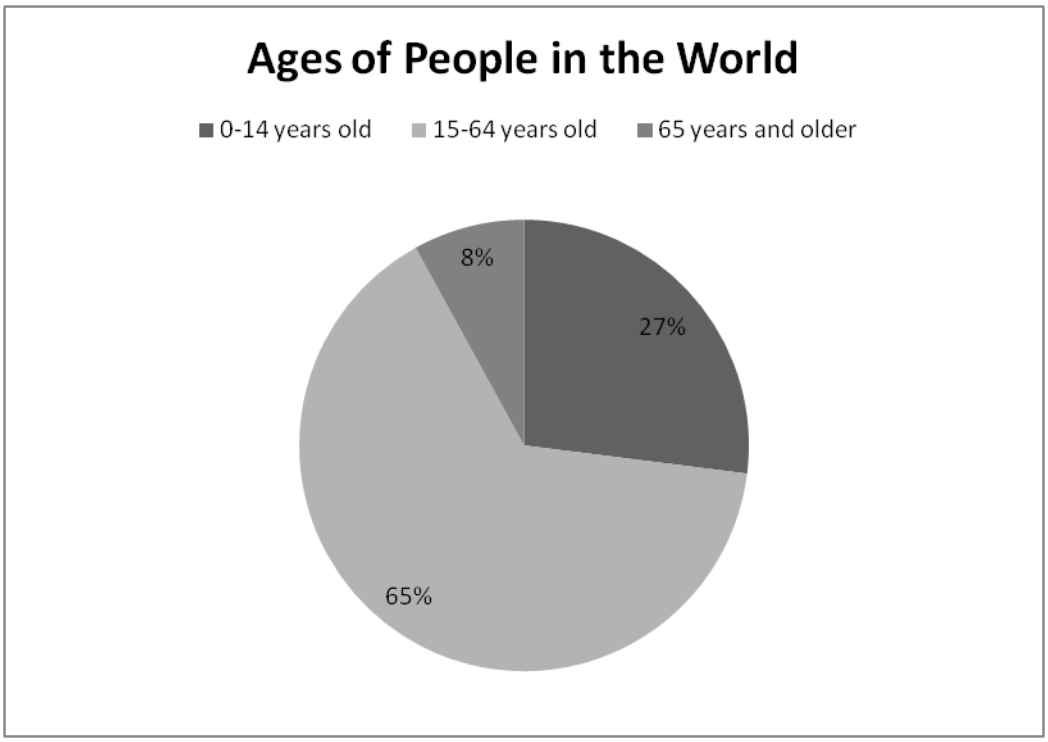


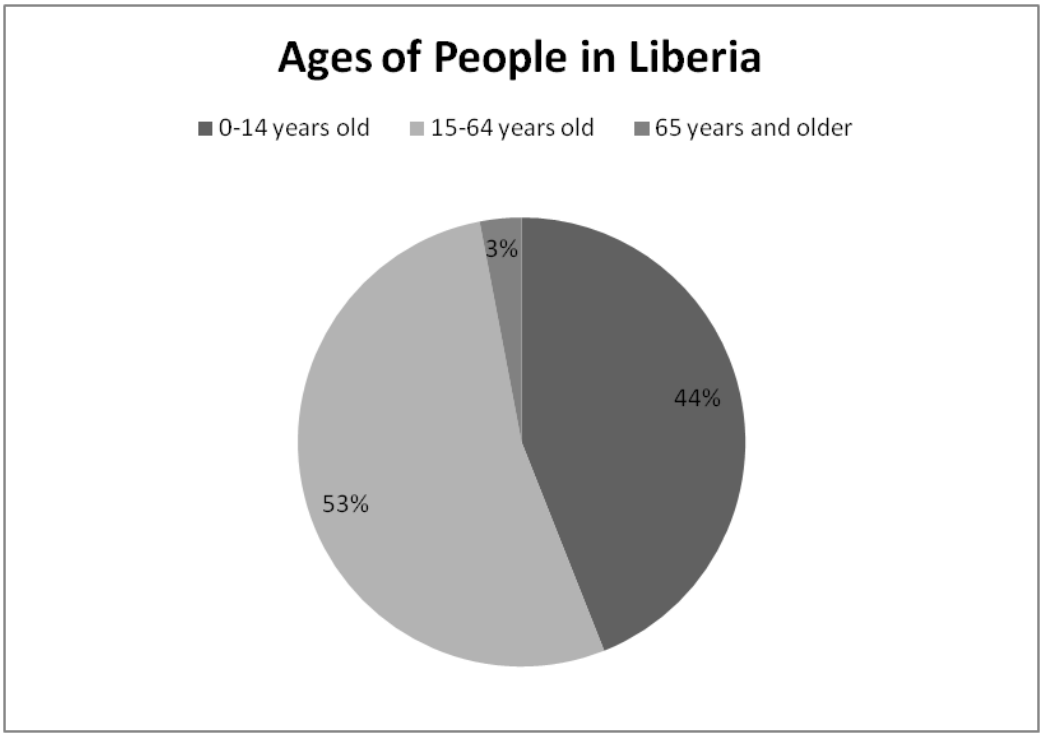
Lesson 95 Diagrams (do not cut apart)





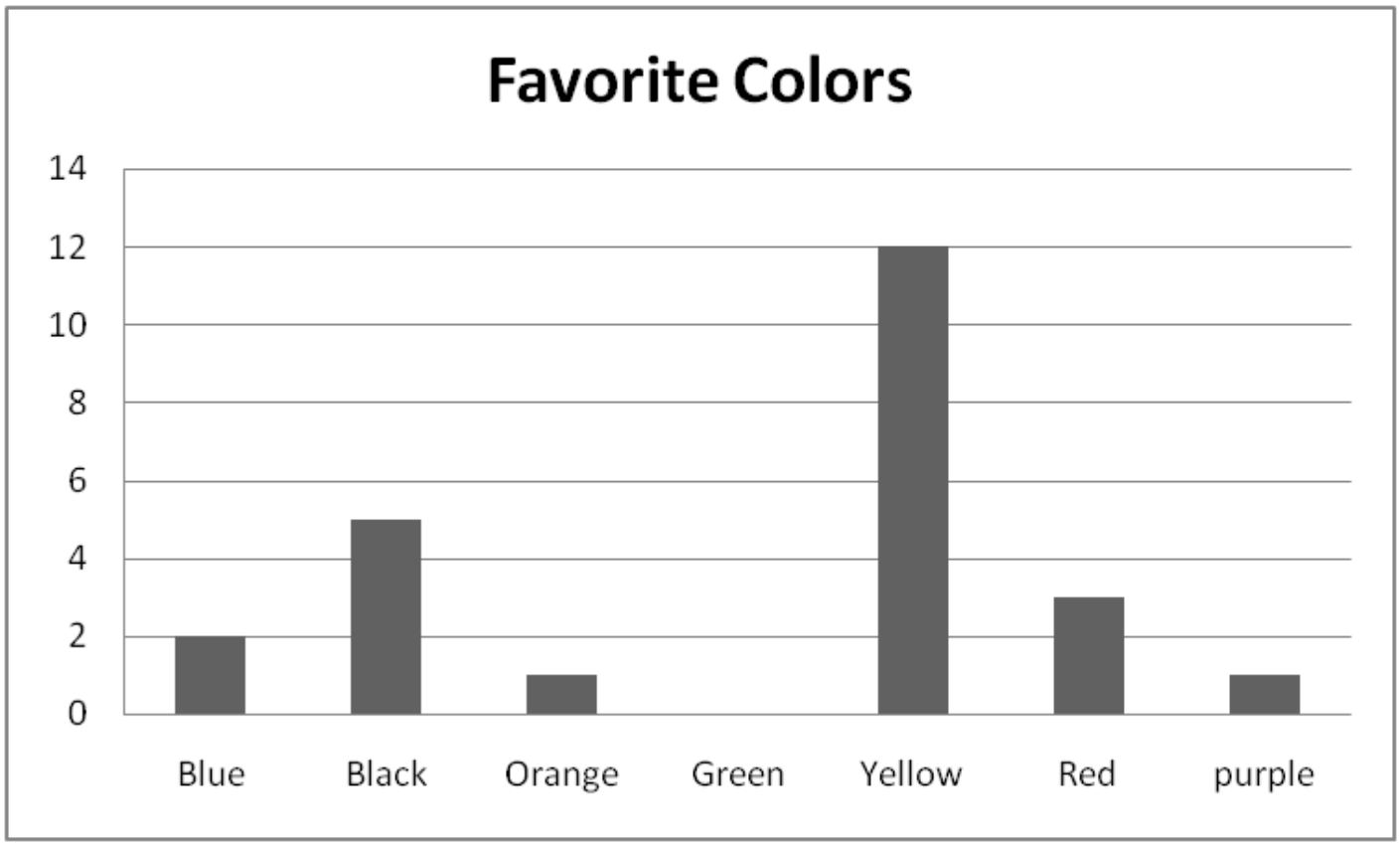
Lesson 95 Diagrams (do not cut apart)





Lesson 96 – How to Make a Bar Graph

(Show this to the learners as an example)



Lesson 102: Project 3: Family Finance, Part 1: Setting up Record-Keeping

Example

Date	Item	Dollars Spent
Tuesday	Fresh food (bananas)	25
	Pencils	7
	Saved	9
Wednesday	Fresh food (potatoes)	20
	Ready food (bread)	18
Thursday	Ready food (cookies)	20

Lesson 102: Project 3: Family Finance, Part 1: Setting up Record-Keeping

Example

	Dollars Spent for Items						
Date	**Fresh food**	**Ready food**	**Alcohol**	**School things**	**Medicine**	**Clothing**	**Saved**
Tuesday	25			7			9
Wednesday	20	18					
Thursday		20		7			

Lesson 103 - Project 4: Nutrition, Part 1: Introduction to Nutrition

(Cut out all 6 cards)

ENERGY FOODS – CARBOHYDRATES

Some foods give us energy to work, to walk, to get up each day. They give us energy to live.

Some Energy foods (carbohydrates) are:

- **Potatoes**
- **Bread**
- **Corn**
- **Millet**
- **Sorghum**
- **Taro**
- **Rice**
- **Wheat**

GROWTH FOODS – PROTEIN

Some foods help us to grow as children. These are proteins.

Some Growth foods (proteins) are:

- **Meat**
- **Fish**
- **Eggs**
- **Cheese**
- **Milk**
- **Yogurt**
- **Beans**

Lesson 103 – Introduction to Nutrition, Continued

REPAIR FOODS – PROTEIN

Some foods help our body heal if we are hurt or sick. These are proteins.

Some Repair foods (proteins) are:

- **Meat**
- **Fish**
- **Eggs**
- **Cheese**
- **Milk**
- **Yogurt**
- **Beans**

REPAIR and HEALTH FOODS - VITAMINS

Some foods help our body heal, and also help our body work better, keeping our skin and eyes and all parts healthy.

Some foods with vitamins are:

- **Fruits**
- **Vegetables**
- **Nuts**

Lesson 103 – Introduction to Nutrition, Continued

NOT HELPFUL FOODS – SUGAR, ALCOHOL

Some foods do **not** help our body, and can make us sick if we eat or drink them too much.

Not helpful foods:

- **Sugar**
- **Alcohol**

ENERGY FOODS - FATS

Some foods give us energy to work, to walk, to get up each day. They give us energy to live.

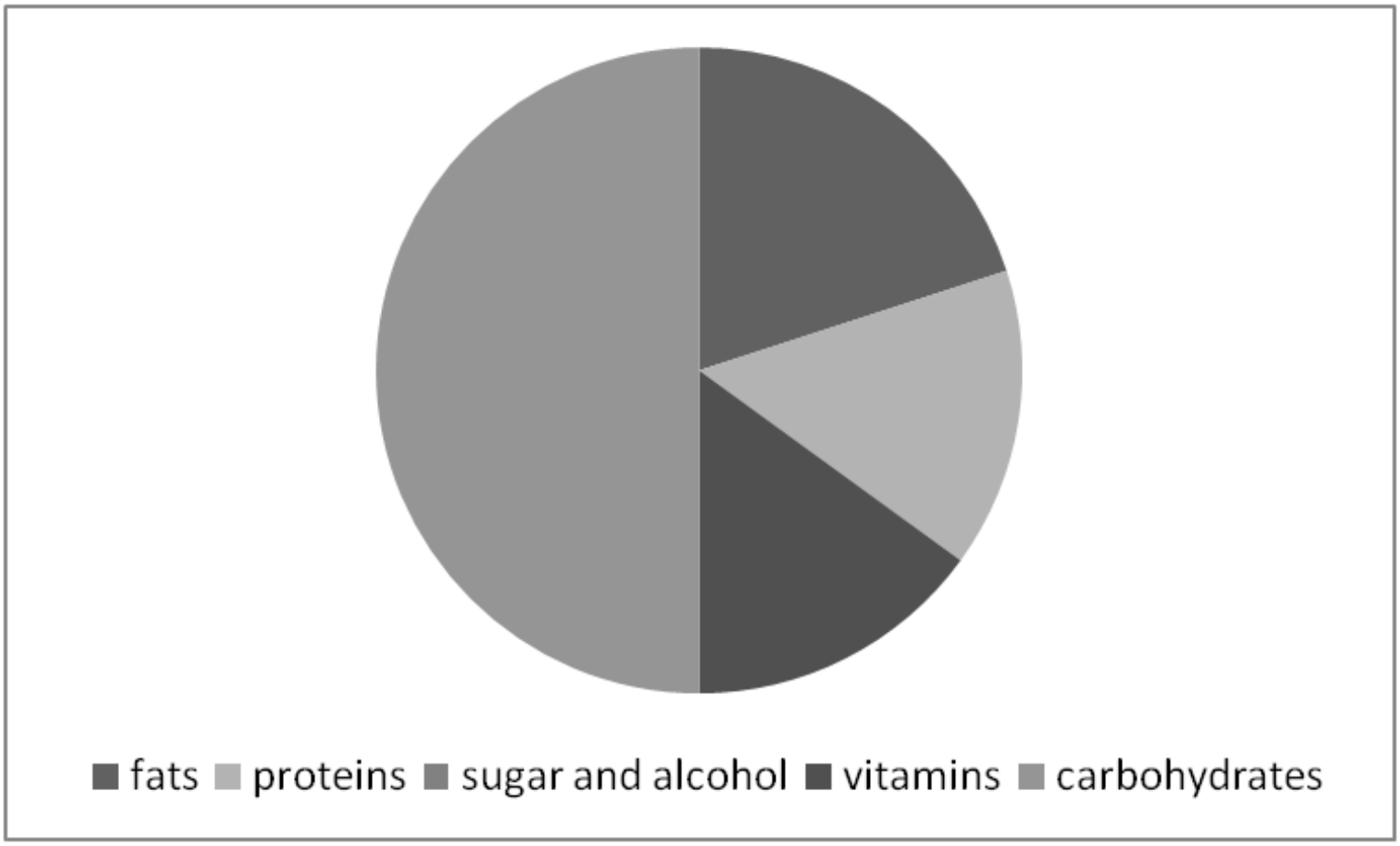
Some Energy foods (fats) are:

- **Oil**
- **Butter**
- **Nuts**
- **Eggs**

Lesson 104: Nutrition Project

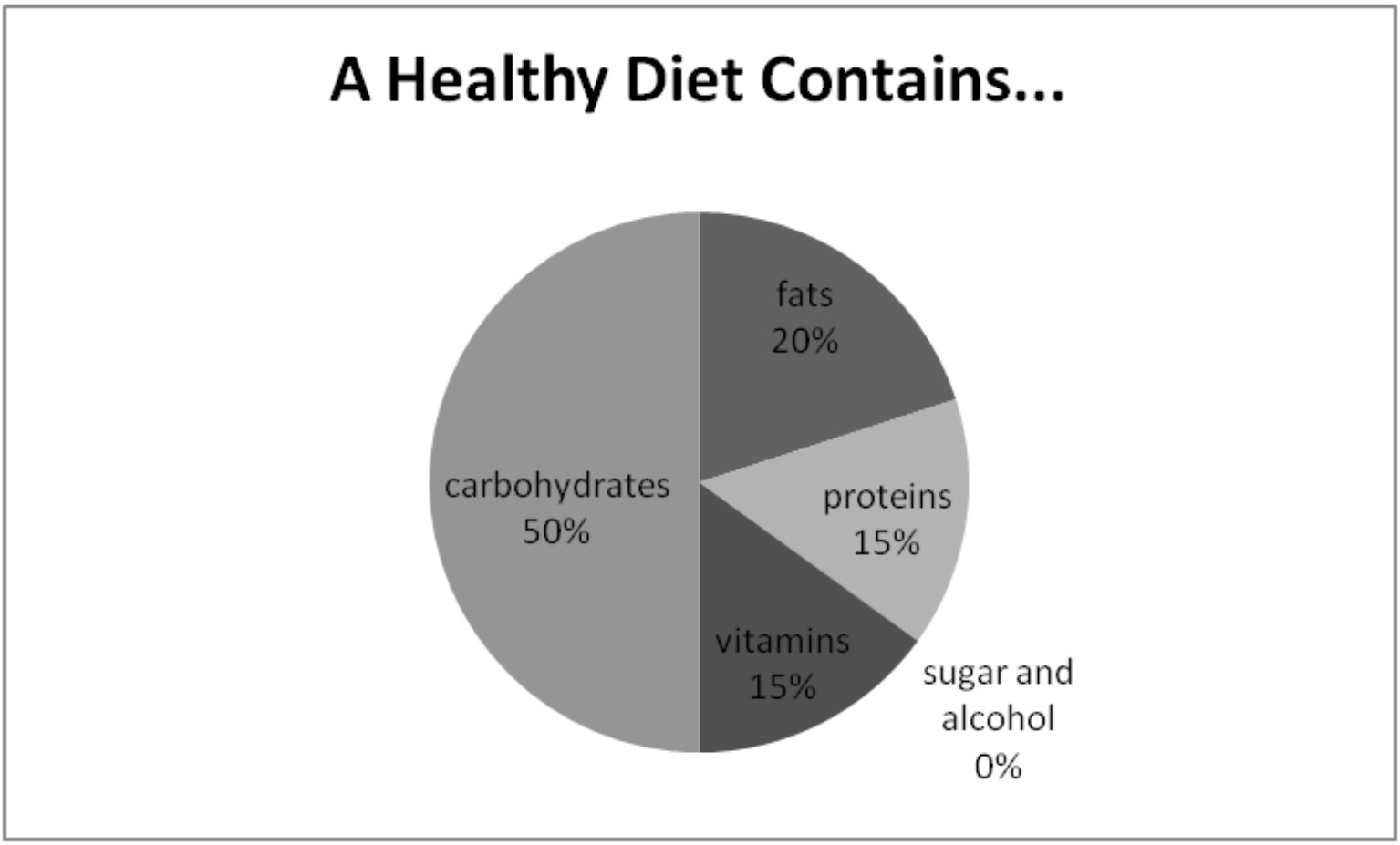
This graph shows what kinds of foods should make up our diets.

What can you tell from this circle graph?



Lesson 104: Nutrition Project

Here is the same graph, with percents:



Lesson 107: Review Cards

1. 4 6 2 + 2 3 4	2. 4 6 2 - 2 3 1	3. 21 X 4	4. 3 4 X 7
5. Measure the length of this line: _____	6. Add the numbers 32, 50, 26 and 16.	7. In a survey, 8 people answered Yes, and 3 people answered No to the question asked. Draw a bar graph showing this.	8. What type of food is rice? What type of food is fish?
9. 3 2 8 4 + 6 2 3 5	10. Your sister makes 120 dollars a week. She spends 80 dollars on food and 30 dollars on other things. How much money can she save each week?	11. If someone drinks 25% of their drink, is that more than half of the drink? Draw a picture of the glass and the drink.	12. Draw a line that is 3 ½ inches long.
13. At the store you buy items that cost $14, $22, $36 and $8. How much will the total be?	14. 4 6 X 7	15. At the store your total comes to $126. You have $150. How much change will you get back?	16. Which number is larger, 2398 or 2938?

Lesson 107 – Review Card Answers

1. 4 6 2 + 2 3 4 **6 9 6**	2. 4 6 2 - 2 3 1 **2 3 1**	3. 21 X 4 **8 4**	4. 3 4 X 7 **2 3 8**
5. Measure the length of this line: _____	6. Add the numbers 32, 50, 26 and 16. **124**	7. In a survey, 8 people answered Yes, and 3 people answered No to the question asked. Draw a bar graph showing this.	8. What type of food is rice? **Energy (carbohydrate)** What type of food is fish? **Repair and growth (protein)**
9. 3 2 8 4 + 6 2 3 5 **9 5 1 9**	10. Your sister makes 120 dollars a week. She spends 80 dollars on food and 30 dollars on other things. How much money can she save each week? **10 dollars**	11. If someone drinks 25% of their drink, is that more than half of the drink? **No**  Draw a picture of the glass with 25% of the drink gone.	12. Draw a line that is 3 ½ inches long.
13. At the store you buy items that cost $14, $22, $36 and $8. How much will the total be? **$82**	14. 4 6 X 7 **3 2 2**	15. At the store your total comes to $126. You have $150. How much change will you get back? **$24**	16. Which number is larger, 2398 or 2938? **2938**